ARCHITECTURAL DESIGN GUIDELINES

FOR SOBER LIVING HOUSING

ON O‘AHU

A DARCH PROJECT SUBMITTED TO THE GRADUATE DIVISION OF THE UNIVERISTY OF HAWAI‘I AT MĀNOA IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

DOCTOR OF ARCHITECTURE

MAY 2018

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Keywords: Sober Living Housing, Design Guidelines, Affordable Housing, Reserved Housing, Kaka‘ako

Abstract

How can housing help individuals recover from drug addiction? This D.Arch (Doctor of Architecture) project studies factors that affect human health, furthermore supporting the success of the individual's sobriety. The goal of this project is to help recovering individuals by decreasing their chances of relapse. The objective of this research is to provide design guidelines and strategies to be used in sober living housing (SLH), by combining extracted information from existing research and a case study on Sand Island Treatment Center's (SITC) staff housing. In order to provide the most successful environment for recovering individuals, this research shows there are three conclusive factors that should be implemented into SLH design. The three factors relate to the physical environment, the social environment, and the immediate (architectural) environment. This project presents design guidelines that should be applied to all three factors. The Physical and Social Environment Design Guidelines should be used for site selection, and the Immediate Environment Design Guidelines (IEDG) should be used for the building design. This indicates that the SLH location is a significant determinant of the success of the recovering individuals. These design guidelines are universal and should be used by planners, architects, developers, and housing owners to provide the best support for the recovering individuals. Finally, this project applies the SLH Design Guidelines and proposes a mixed-use and mixed-income housing development (Hoʻāliʻi) in Kakaʻako.

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List of Abbreviations and Symbols

A-1	Apartment, Low Density
ADF	Alcohol and Drug Free
AMX-2	Apartment Mixed Use, Median Density
ASHRAE	American Society of Heating, Refrigerating and Air-conditioning Engineers
BIG	Bjarke Ingels Group
CCHNL	City and Council of Honolulu
CSTL	Clean and Sober Transitional Living
DARCH	Doctor of Architecture
DBEDT	Department of Business, Economic Development and Tourism
DOT	Department of Transportation
DPP	Department of Planning and Permitting
FAR	Floor Area Ratio
FGI	Facility Guidelines Institute
HCDA	Hawai‘i Community Development Authority
HPD	Honolulu Police Department
HSH	Hawai‘i State Hospital
HVAC	Heating, Ventilation, and Air-Conditioning
IEDG	Immediate Environment Design Guidelines
IOM	Institute of Medicine
KCDD	Kaka‘ako Community Development District
LUO	Land Use Ordinance

MCAB	Marine Corps Air Base
NIMBY	Not In My Back Yard
NRC	National Research Council
NSH	Nova Scotia Hospital
ORS	Options Recovery Services
POW	Prisoners of War
PEDG	Physical Environment Design Guidelines
R-5	Residential, 5,000 square feet
SEDG	Social Environment Design Guidelines
SITC	Sand Island Treatment Center
SLH	Sober Living House/Housing
SRO	Single-Room Occupancy
TOD	Transit-Oriented Development
WC	Women and Children

Introduction

Drug Addiction on O‘ahu

According to Hawaii News Now, there were 16,000 arrests made on O‘ahu in 2016, and forty-three percent were homeless. Of those, seventy-two percent were suffering from mental illness or drug addiction.[1] This statistic suggests there is a need for treatment and housing for individuals suffering from drug addiction.

Individuals can complete treatment, but the main challenge is being able to maintain sobriety, especially if individuals return to detrimental environments. To emphasize, “addiction is a chronic relapsing disorder,” and life after treatment is critical towards recovering individuals. According to Best and Lubman, “the typical time from first substance use to stable recovery is twenty-seven years.”[2] Relapse is a common obstacle that recovering individuals must overcome in order to reach sobriety, and this project seeks to find how housing can be the solution.

Relapse

The purpose of a rehabilitation facility is to help individuals struggling with addiction to regain a lifestyle that promotes good health and sobriety. There are four different rehabilitation typologies an individual can attend to seek help overcoming addiction: inpatient, outpatient, housing, and drop-in treatment services. After inpatient treatment is completed, patients have the decision of returning home or moving into housing. Both options place a huge sense of responsibility on the individual and a

[1] Allyson Blair, "Most Oahu Arrests Involve Those with Drug Addictions, Mental Illness," (2017).
[2] David W. Best and Dan I. Lubman, "The Recovery Paradigm - a Model of Hope and Change for Alcohol and Drug Addiction," *Australian family physician* 41, no. 8 (2012): 596.

majority of these individuals will experience relapse. It appears there are limited options that creates a disconnection between treatment and sobriety. The purpose of this research is to develop a set of design guidelines for sober living housing (SLH) to provide a safe and successful living environment to prevent relapse.

Housing is an option for recovering individuals to use as a prevention from relapsing. Individuals can choose to live in transitional housing or SLH to help their process of recovery. Transitional housing and SLH are drug and alcohol free environments. There is usually no form of treatment but group meetings are strongly encouraged. Individuals who live in transitional housing or SLH typically have completed a form of treatment and have maintained sobriety prior to living in these types of housings. Residents are responsible for their own rent, house chores, and following house rules.[3]

Existing Transitional and Sober Living Housing for Recovering Individuals on O‘ahu

There are three housing services on O‘ahu for people in recovery: Oxford House, Inc., Salvation Army Family Services – Ka‘ohu hou O Mānoa, and the staff housing at Sand Island Treatment Center (SITC).

[3]Henderson Polcin DL., D, "A Clean and Sober Place to Live: Philosophy, Structure, and Purported Therapeutic Factors in Sober Living Houses," *Journal of Psychoactive Drugs* 40, no. 2 (2008).

Oxford House, Inc.

Oxford House is a SLH that is sustained and is managed by the residents. Oxford House, Inc. is a non-profit corporation and an umbrella organization "that provides the network connecting all Oxford Houses and allocates resources to duplicate the Oxford House concept where needs arise."[4] Oxford Houses are single-family houses located in good neighborhoods with access to transportation, "jobs, schools, and health and social services."[5] The house can range from six to fifteen occupants of the same sex.[6] All individuals inquiring residency at an Oxford House, must go through an application and interview process, with existing house members. The existing members of the house must come to an eighty percent positive agreement, to approve new members.[7] All house members have "equal votes and share equally in house duties."[8] Duties consist of rent and house chores. According to Oxford Houses, the model works because there is an unlimited amount of stay, runs on a democratic system, relies on a self-support system, and the strict rule of expulsion if any resident uses drugs or alcohol.[9]

Currently, there are thirty-seven Oxford Houses located all over O'ahu. There are three female houses, thirty-three male houses, and one women's and children house. The average weekly rent at an O'ahu Oxford House is $100 per week.[10] Currently, there are fifteen homes with open vacancies.[11]

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[4] "Oxford House," https://www.oxfordhouse.org/userfiles/file/purpose_and_structure.php.
[5] Friedner D. Wittman, "Affordable Housing for People with Alcohol and Other Drug Problems," *Contemporary Drug Problems* 20, no. 3 (1993).
[6] "Oxford House." https://www.oxfordhouse.org/userfiles/file/purpose_and_structure.php.
[7] "Faqs." http://www.oxfordhousehi.org/index_files/Page441.htm.
[8] Wittman, Friedner D. "Affordable Housing for People with Alcohol and Other Drug Problems." *Contemporary Drug Problems* 20, no. 3 (1993): 571.
[9] Molloy, J. Paul. "Hawaii Oxford House Resident Profile." Silver Spring, Maryland: Oxford House World Services, 2005.
[10] "Faqs." http://www.oxfordhousehi.org/index_files/Page441.htm.
[11] "Oxford House International." http://www.oxfordhouse.org/directory_listing.php.

Table 1.1 Oxford Houses - O'ahu

HOUSE NAME	CITY	TELEPHONE	GENDER	CAPACITY	#VACANT BEDS	DATE OPENED
AKONE PL	HONOLULU	843-1713	M	10	0	10/01/2011
ALA 'UME	HONOLULU	988-2353	F	8	0	08/01/2001
ALIAMANU	HONOLULU	422-8312	M			07/15/2012
COCONUT GROVE	KAILUA	263-1310	M	10	0	11/15/2012
HARDING AVE	HONOLULU	732-7260	M	8		01/15/2004
HAU ST	HONOLULU	691-0777	M	10	0	06/30/2011
HO'OHALI'OLI	HONOLULU	848-8612	M	7	0	05/05/2010
KAHUAMO	WAIPAHU	671-8993	M	6	0	
KALANI	HONOLULU	841-0979	M	10	1	10/24/2014
KALIHI VAL-LEY	HONOLULU	842-1817	M	10	1	08/01/2001
KAM IV	HONOLULU	845-2083	M	6	0	06/02/2002
KEALOHA	HONOLULU	892-4231	M	10	2	
KULUA	WAIPAHU	671-8993	M	6	5	10/05/2013
KUOKOA	HONOLULU	845-2083	M	10	0	02/01/2012
LOAA ST	WAIPAHU	671-8304	M	10		06/01/2009
LOPEZ LANE	HONOLULU	843-0569	F	10		06/24/2004
MAHANA	HONOLULU	848-0829	M	10	1	11/01/2011
MAKAHA 1	WAIANAE	691-9033	M	6	4	
MAKAHA 2	WAIANAE	691-9033	M	6	0	
MAKALEA	EWA BEACH	888-2384	W	9	3	04/15/2012
MALUHIA	HONOLULU	842-3560	M	10	1	10/05/2006
MANA'OLANA	HONOLULU	848-8621	M	6	0	05/05/2010
MOEKOLU	WAIANAE	888-6663	WC	10	1	
MOELIMA	WAIANAE	492-1917	M	10	5	
NAMOKU	KANEOHE	235-2264	M	8	0	02/15/2003
NIU VALLEY	HONOLULU	200-1568	M	10	1	
NOELANI	PEARL CITY	842-4429	M	10	2	
NOHO KULA	HONOLULU	836-0393	F	10	3	12/27/2012
NOHO UKA	HONOLULU	688-6868	M	8	0	10/15/2006
PALOMA	KAILUA	263-3357	M	10	0	
PA0PUA	KAILUA	261-2784	M	10	0	06/01/2014
PILIWAI HALE	HONOLULU	957-0324	M	6	0	04/01/2006
PUALI	KANEOHE	312-4337	W	10	0	
UHU	HONOLULU	773-7805	M	10	2	
WAILELE	HONOLULU	425-5987	M	8	1	
WAILELE ELUA	HONOLULU	6886868	M	6	0	
WAIMALU	AIEA	486-0032	M	7	0	11/01/2003

a. Source: "Oxford Vacancies." https://www.oxfordvacancies.com/. Table made by Author.

Salvation Army Family Treatment Services – Ka‘ohu hou O Mānoa

Salvation Army Family Treatment Services - Ka‘ohu hou O Mānoa offers transitional housing for “homeless women in stable recovery and their children.”[12] Ka‘ohu hou O Mānoa is located in Mānoa Valley. It is named after the literal translation “the fresh mist of Mānoa” and its symbolic meaning refers to the fresh mist that covers all the cracks and rocky surfaces, referring to what the program provides for recovering women and their children. Housing is available up to two years. Many residents come from the Salvation Army inpatient treatment and therapeutic services. Ka‘ohu hou O Mānoa also is part of the Aloha United Way 211 referral service. Residents are required to have a job or attend school or training programs and provide good care for their children, which is a strategy used to connect to the community. There is a $350 per month-rent that covers one parent and one child. There is a $50 fee charged every month for any additional children. There are two six-family homes available. Each house has two communal bathrooms, a commercial kitchen, a living room, and a computer room. Each bedroom has a “full-sized bed, bunk bed, dresser, desk, and closet.” Ka‘ohu hou O Mānoa has a full-time staff (Richard and Debbie Ross) that lives on site, a full-time support staff, and part-time substance abuse counselors. Residents are required to meet with the support staff to acquire career, parenting, and savings advice. Residents are also required to attend weekly support meetings, with the purpose being to interact with the outside community.[13]

[12] "Hawaiian and Pacific Islands Division - Family Treatment Services." http://hawaii.salvationarmy.org/hawaii/fts.

[13] "Interview with Richard and Debbi at the Manoa Transitional Housing Program Now Available.". 2017.

Sand Island Treatment Center

Sand Island Treatment Center (SITC) is known for their intensive drug rehabilitation treatment program that offers inpatient treatment for adult men and women suffering from a drug addiction. In addition, SITC also offers free staff housing.

All SITC staff has completed the treatment program at SITC. There are two phases of the intensive rehabilitation program. Phase one or "pre-transition" is when "clients"[14] are introduced to a new framework of thinking by completing the first four steps, meeting individually with their counselors, and attending group classes and meetings.[15] During this phase, selected clients are given the opportunity to participate in the SITC internship until completion of rehabilitation. The purpose of the internship is to develop future staff members. The interns receive a stipend for their work.[16] The second phase of treatment or the "transition" phase is the hardest phase of treatment. Clients are given more responsibility and less oversight. Clients are required to obtain and hold a full-time job. They are required to implement all learned material from phase one into real life scenarios.[17] To complete the rehabilitation program, clients are required to go through both phases and complete a twenty-four month stay at SITC. Once the intern has completed both phases of treatment, they can become a paid staff member.[18]

In order to become staff and live at SITC, the individual must be offered the intern position during treatment and complete treatment at SITC. During a conversation with one of the SITC counselors, it was noted that about twenty-five percent (around ten

[14] Individuals in treatment at SITC are referred to as "clients".
[15] Counselor, interview by Catherine C. Kenjo, November 1, 2017, SITC.
[16] Ibid.
[17] Ibid.
[18] Ibid.

staff members) of the SITC staff, live on site. The staff housing is made out of refurbished shipping containers. Each staff receives their own private room, approximately 100 square feet. Although treatment is offered to the public, the free housing is only available to SITC staff.

The accessibility of treatment and the availability of housing on Oʻahu needs improvement. Oxford Houses has the highest availability with multiple locations with current vacancies on Oʻahu, but also the most expensive. The stability of the clean and sober environment is also questionable, and really depends on the level of trust among residents. [19] In comparison to Oxford Houses, Kaʻohu hou O Mānoa and SITC staff housing offers a structured environment. Considering, the extensive length to a stable recovery, SLH should have an unlimited stay.

Table 1.2 Oʻahu Housing Comparison

HOUSING	TYPE	LOCATION	CONTEXT	COST/MONTH	MAX OCCUPANCY	ROOM TYPE
OXFORD HOUSE	SINGLE-FAMILY HOUSING	MULTIPLE	RESIDENTIAL	$400	6-10	SHARED
KAʻOHU HOU O MĀNOA	MULTI-FAMILY HOUSING	MĀNOA	RESIDENTIAL COMMERCIAL	$350 (MOM & ONE CHILD) *ADDITIONAL $50/CHILD	12 (FAMILIES)	FAMILY SHARES ONE BEDROOM
SITC	STAFF COMMUNAL LIVING	SAND ISLAND	INDUSTRIAL	FREE	10	SRO

[19] Counselor.

Currently, Oxford Houses and SITC staff housing are the only (unlimited stay) housing available, on O‘ahu. SITC staff housing is only available to SITC staff, really only making Oxford Houses the most accessible SLH on O‘ahu. Due to the self-governed system and lack of professional supervision, Oxford Houses relies heavily on social support. In cases where there is little social support, these houses can turn into a harmful environments, in which it becomes known to the recovering society, and most would consider as undesirable, but it ultimately depends on the individuals’ commitment of staying sober.[20]

What creates the best environment for SLH, to provide individuals with the most success, once they are ready to commit to a SLH? Part 1 discovers the determinants of the environment that decrease the chance of relapse, and shares the SLH Design Guidelines with architects, planners, developers, and housing owners. The SLH Design Guidelines are developed because existing research on SLH design is limited or vague, resulting in fragmented guidelines. Through existing research and the SITC staff housing case study, Part 1 indicates that there are three components of a healthy environment: the physical environment, the social environment, and the immediate (architectural) environment. The SLH Design Guidelines covers all three environments. This research demonstrates that the location of the site is a predominant factor to prevent relapse and that the architectural design is supplementary. The Physical Environment Design Guidelines (PEDG) and the Social Environment Design Guidelines (SEDG) are universal and should be used during the site selection phase of design; to determine the most

[20] Ibid.

successful and healthiest location. Once, an appropriate site is selected, the Immediate Environment Design Guidelines (IEDG) should be used for architectural design that supports the physical and social environments in relapse prevention.

Part 2 demonstrates how the SLH Design Guidelines can be used, by applying the methods on Oʻahu. The PEDG is first used to locate three possible locations (Waipahu, King Street, and Kaneohe) for a new SLH to exist. Lastly, the comparison of existing qualities of the physical and social environments of the three sites, determine the best site for SLH, which ends up being the King Street site. The PEDG and the SEDG determines the use of Hoʻāliʻi, as a mixed-use and mixed-income high rise development. Commercial spaces are on the ground level with residential spaces are above. A three-floor prototype is developed in response to the IEDG and collective housing precedents, in order to increase social interaction and maintain privacy, for the residential units.

Part 1: Research

Part 1 is the development of the SLH Design Guidelines, by analyzing existing research, conducting a case study, and extracting essential information to include in the design guidelines. At the end of each chapter, the extracted information to be used towards the development of the SLH Design Guidelines will appear. Chapter 1 explores the determinants of good health, in order to prevent relapse. Chapter 1 focuses on how the physical and social environment affect human physical and mental health, which consequently affects the maintenance of sobriety. Studies are done by the National Research Council (NRC), the Institute of Medicine (IOM), Appleyard and Lintel, Ann Forsyth, Gary W. Evans and Sheldon Cohen, Ralph B. Taylor, Nicholas Freudenberg, and Jo Nurse, Paul Woodcock, and Jim Ormsby. Chapter 2 analyzes research specific to transitional and SLH, by Morgan M. Carter, Omar Youseff, Chioma Velma Anelo, Douglas L. Polcin, Rachel Korcha, Jason Bond, Grant Holloway, Friedner D. Wittman, and Mardelle Shepley. Chapter 3 is the Sand Island Treatment Center (SITC) case study, which analyzes the existing environment of the staff housing. Together, all three chapters contribute to the SLH Design Guidelines for SLH, which are explained in Chapter 4.

Chapter 1: How does the Environment Affect Human Health?

The environment affects human health, both mentally and physically. Understanding the environmental factors that affect human health is necessary, especially when designing for a sensitive population. In order to maintain sobriety, individuals need to be in positive environments that are supportive to their mental and physical health. This chapter will examine existing research on environmental factors known to affect human health, mentally and physically.

The National Research Council (NRC) and the Institute of Medicine (IOM) defines the environment by the physical environment and the social environment. The organization of surroundings and proximities of the physical environment affects the systems of the social environment, consequently affecting human health. Physical environmental factors that affect health include "harmful substances, such as air pollution or proximity to toxic sites; access to various health-related resources; and community design, and the built environment."[21] Social environmental factors that affect health include "safety, violence, and social disorder."[22] These physical and social environmental factors should be addressed and evaluated during the site selection phase of design.

1.1 The Physical Environment

The NRC and the IOM states the first factor of the physical environment is air pollution. [23] Air pollution has been proven to be a major determinant of "the amount of

[21] Steven H. Woolf et al., *U.S. Health in International Perspective : Shorter Lives, Poorer Health* (Washington, District of Columbia : The National Academies Press, 2013), 193.
[22] Ibid., 196.
[23] Ibid., 193.

time we spend outdoors and the extent of our physical activity."[24] Air pollution comes from anthropogenic and natural sources. Some examples of anthropogenic sources are power plants, factories, landfills, and automobiles. Natural sources of air pollutants can include gas released from the earth, such as radon, sulfur, chlorine, and carbon monoxide.

According to the NRC and the IOM, the built environment is another factor of the physical environment that affects human health. The built environment pertains to the design of physical environment.[25] Access and proximities to resources are important to human health and can influence human behavior, both positively and negatively. Essential resources include health-related resources, recreational facilities, street connectivity, and transportation systems.[26] Health-related resources can include access to healthcare and health-food stores.[27]

The proximity of recreational facilities, street connectivity, and transportation systems can predict the walkability of the built environment, resulting in a direct correlation of health.[28] In contrast, access and proximity to unhealthy resources has shown results in an increase of health-related problems.[29] The design of the built environment also affects the probability of social interaction in relation to the quality of air and noise. Appleyard and Lintel's studies show there is an indirect correlation between street design and social interaction. Their study shows, the busier and louder the street, the less social interaction occurs.[30] Ann Forsyth identifies the qualities and

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[24] Gary W. Evans, "Environmental Stress," (Cambridge [Cambridgeshire] ; New York: Cambridge Cambridgeshire ; New York : Cambridge University Press, 1982), 105.
[25] Woolf et al., *U.S. Health in International Perspective : Shorter Lives, Poorer Health*, 195.
[26] Ibid.
[27] Ibid.
[28] Ibid.
[29] Ibid.
[30] Evans, "Environmental Stress," 55.

outcomes of a walkable environment. In order to get outcomes such as "lively and sociable, sustainable, and exercise-inducing" environment, the walkable environment must have qualities of "traversable, compact, safe, and physically-enticing." Traversable means a "smooth path." Compact relates to "providing short distances to destinations." Safe is defined by "perceived and actual crime and traffic safety." "Physically-enticing environments" have qualities of "full pedestrian facilities," and can include interesting views.[31]

Gary W. Evans and Sheldon Cohen's study documents how humans are negatively affected by increased heat in the physical environment, a factor that is not recognized by the NRC and the IOM. This theory began with the urban riots of the 1960s which provoked environmental psychologists to conduct studies on the effects of heat.[32] Evans and Cohen's research also states there is a direct correlation between hotter weather and increased alcohol consumption, and possibly the cause of increased aggression. [33]

1.2 The Social Environment

The physical environment allows the social environment to exist. The NRC and the IOM state social environmental factors that affect health include "the type, quality, and stability of social connections, including social participation, social cohesion, social

[31] Ann Forsyth, "What Is a Walkable Place? The Walkability Debate in Urban Design," (2015).
[32] Ibid., 92.
[33] Ibid., 94.

capital, and the collective efficacy of the neighborhood environment."[34] Without a stable social environment, community members may feel unsafe and insecure. [35]

Ralph B. Taylor summarizes Popenoe's research of factors of a healthy community. The six important factors that should exist in a healthy social environment include: social interaction, social control, a sense of security and ease, organizational ties, collective identity and sense of place, and socialization.[36] Social interaction relates to the availability and accessibility of surrounding peers.[37] A healthy social environment possesses social control and a sense of security and ease. The lack of social control would result in "crime and delinquency."[38] The lack of sense of security and ease would result in "feelings of fear or concern about the community."[39] Organizational ties refers to social participation, such as "locality-based institutions, neighborhood associations, and church groups."[40] A healthy social environment should have a collective identity and sense of place, which results in residents feeling positive about their social status.[41] Socialization relates to the shared interactions amongst community members, allowing and helping each other grow.[42]

Nicholas Freudenberg brings up an important notion of when density turns into crowding. Although density holds both positive and negative qualities, too much density can contribute to "social isolation and social diseases like substance abuse and

[34] Woolf et al., *U.S. Health in International Perspective : Shorter Lives, Poorer Health*, 196.
[35] Ibid.
[36] Evans, "Environmental Stress," 289-89.
[37] Ibid.
[38] Ibid.
[39] Ibid.
[40] Ibid.
[41] Ibid.
[42] Ibid.

violence."[43] The following study by Jo Nurse, Paul Woodcock, and Jim Ormsby's show the effects of a negative social environment, specifically when there is a lack of social cohesion, resulting in stress and isolation in prisons. Their conclusion shows, prisoners who were exposed to long durations of isolation with "little mental stimulus contributed to poor mental health and led to intense feelings of anger, frustration, and anxiety." [44] Prisoners were reported to misuse drugs to cope with the many boring hours of isolation.[45] Both staff and prisoners reported high levels of stress which encouraged the researchers to study the social connection between the two parties. Poor social capital resulted in stressed staff and prisoners causing a "circle of stress."[46] Stressed staff resulted in frequent sick days causing a staff shortage. The staff shortage resulted in longer locked-up time for the prisoners, which made the prisoners stressed, and resulted in releasing their frustration out on staff, and caused the cycle to continue. [47]

Research presents the importance of the environment, and the corresponding effects of a well-designed physical environment on the social environment. Both physical and social environmental factors need to be considered during the site selection of housing, in order to provide the recovering individuals the most success to sustain their sobriety.

The extracted information to be used in the development of the SLH Design Guidelines are:

I. Physical Environment
   A. Built Environment

[43]Ibid.
[44] Jo Nurse, Paul Woodcock, and Jim Ormsby, "Influence of Environmental Factors on Mental Health within Prisons: Focus Group Study.(Primary Care)," *British Medical Journal* 327, no. 7413 (2003): 480.
[45] Ibid.
[46] Ibid.
[47] Ibid.

1. Access to transportation[48]
2. Access to health and social services[49]

B. Air Quality[50]

II. Social Environment

A. Type, quality, and stability of social connections[51]

[48] Woolf et al., *U.S. Health in International Perspective : Shorter Lives, Poorer Health*, 195.
[49] Ibid.
[50] Ibid., 193.
[51] Ibid., 196.

Chapter 2: Existing Research and Guidelines

Currently, there is minimal research on sober living housing (SLH) architecture, resulting in insufficient design guidelines. Design guidelines for psychiatric facilities, mental and behavioral facilities, and inpatient and outpatient treatment centers can be found in the "Facility Guidelines Institute" (FGI) and "Hospital Interior Architecture" by Jain Malkin, but there are no design guidelines for SLH for recovering individuals. Existing guidelines tend to focus on only one aspect of SLH compared to the whole design, such as interior architecture. Although there are design guidelines for similar building typology, there should be a comprehensive and detailed set of design guidelines specifically for SLH. The recommendations proposed from existing research on similar typology is respectful and suitable to use as a basis towards the development of a comprehensive set of design guidelines.

2.1 Physical Landscape/Mental Landscape: Mental Health, Architecture and the City by Morgan M. Carter

Morgan M. Carter explores the relationship between people with mental health issues and the built environment. Carter researches to understand the role of architecture in the rehabilitation of a person with a mental illness. Carter uses Halifax for investigation. He states that there are three stages of recovery: anguish, hope, and empowerment. Carter believes psychiatric centers need to be broken up programmatically and physically. The program will be broken into four parts: impatient services, outpatient services, housing, and drop-in services. Carter uses case studies to provide the design strategies.

Morgan M. Carter investigates Halifax's relationship between mental help and

architecture.[52] Carter uses the four typologies of rehabilitation facilities: inpatient services, outpatient services, housing, and drop-in services located in Halifax and relates these typologies to the three stages of recovery: anguish, hope, and empowerment. He chooses a site, by using mapping as a selection technique. First starting with mapping out the primary hospitals and outpatient clinics, next mapping out all the secondary support services in the Halifax area. Carter points out that the two main psychiatric centers "Nova Scotia Hospital and Bayer's Road Outpatient Clinic are not located where most of the secondary services are."[53] Central Halifax and Dartmouth are the two densest areas that were chosen to investigate further. The next series of map concentrates on Central Halifax and Dartmouth. Carter establishes nine zones that can potentially be used as the site. These nine zones are characterized as having pedestrian commercial activity that will integrate patients with the community. To narrow the nine possible sites, Carter walked these pedestrian-commercial active streets. Eventually, four sites are chosen to be carefully examined to integrate programmatic elements of the psychiatric center, relating to the three different stages of recovery. A program of anguish (first stage of recovery) would be a "hospital with a reading room and cage, as well as offices for publicly oriented Mental Health agencies such as the Canadian Mental Health Association and the Nova Scotia Hospital (NSH) Foundation."[54] A program of hope (the second stage of recovery) would be "the outpatient clinic and transitional housing which makes use of a ceramic studio and gallery and fitness center, respectively, as means of

[52] Morgan M. Carter, "Physical Landscape/Mental Landscape: Mental Health, Architecture and the City" (Dalhousie University, 2008), v.
[53] Ibid.,27.
[54] Ibid., 37.

generating interaction with the public."[55] The program of empowerment (the final stage of recovery) would be "the existing Oxford Theater to insert a client-run drop-in center which takes the form of an independent film making cooperative to blur the boundary between client and public."[56]

Carter's research displays both physical and immediate environmental factors that encourage social interaction.

The extracted information to be used towards the development of the SLH Design Guidelines are:

I. Physical Environment
   A. Locate in a pedestrian-oriented location to increase social interaction.[57]
II. Immediate Environment
   A. Design should encourage social interaction by incorporating spaces for hobbies and activity: ceramic studio and gallery, fitness center.[58]

2.2 Therapeutic Architecture Design Index by Omar Youseff

Therapeutic architecture is created with components from the built environment and the human-health environment. The built environment is defined as spatial, luminous, thermal, and sonic design. Human-health environment is defined by the human brain, mind, body, and behavior. Building form, orientation, fenestration, insulation, ventilation, shortwave reflectance, shading, daylight, internal forces, and HVAC systems are impact areas in the built environment. Photometric, circadian, sight/views, preference, temperature, visual comfort, anxiety, performance, sweat, and glare are the impact areas of the human-health environment.[59] Omar Youseff focuses on

[55] Carter, "Physical Landscape/Mental Landscape: Mental Health, Architecture and the City", 64.
[56] Ibid.
[57] Carter, "Physical Landscape/Mental Landscape: Mental Health, Architecture and the City", 37.
[58] Ibid.
[59] Omar. Youssef, "Therapeutic Architecture Design Index," (Arizona: University of Arizona, 2014), 4.

luminous intensities design. Luminous intensity is related to fenestration, insulation, ventilation, shortwave reflectance, shading, and daylight. Youseff conducts two studies to conclude how the human body is affected by natural daylight by studying photometrics and glare. Youseff suggests to not just use ASHRAE's guidelines of how to measure luminous intensities. Youseff mentions the importance of transition zones in spaces and windows. Transition zones will make the user feel more comfortable and perform better.

Omar Youseff's study on how the human body is affected by natural daylight by studying photometrics and glare concluded that testing of illumination should not only rely on standard building codes. Different usages of space require different light intensity-testing on a work plane. Youseff composed four recommendations based off of the glare test. Spaces should be designed with multiple sources of light. Transition zones should be created in between spaces or within a space. Designers should not rely on the objective index of quality of light and consider the human visual comfort. Transition zones should also be created for windows.[60]

Youseff's research and recommendations for light state important immediate environmental factors that affect human comfort.

The extracted information to be used towards the development of the SLH Design Guidelines are:

I. Immediate Environment
   A. Spaces should have multiple sources of light. [61]
   B. Transition zones should be created in between spaces, within a space, and for windows. [62]

[60] Ibid., 3-8.
[61] Ibid.
[62] Ibid.

2.3 Reconsidering Rehabilitative Environments: Transitional Housing for Recovering Drug Addicts by Chioma Velma Anelo

Chioma Velma Anelo created a set of guidelines for transitional housing for recovering drug addicts. Anelo created a design based off her design guidelines. She set her site in the Gottingen Street Neighborhood in Halifax, Nova Scotia. This neighborhood has become a ghetto. Anelo believes the neighborhood needs a revitalization and that transitional housings need to be included in order to revitalize the area. From Anelo's studies, she concludes that adding a commercial component is very important in transitional housing. Anelo's three guidelines are to place the facility in a supportive community, create social spaces within the facility to promote socializing, and the scale and function should enhance previously stated guidelines. She mainly expresses her focus on creating social spaces. There are many social communal spaces throughout her building design.[63]

Anelo implemented her guidelines into her design. She designed transitional housing in Halifax, Nova Scotia on Gottingen Street. The building shape is positioned and shaped as an L for maximum south sun exposure. There are four components within the building: the housing, the commercial, the courtyard, and the social core. The housing component consists of "a five bedroom apartment as a rooming house for transitional housing, eight bachelor units, six one-bedroom units, and three two-bedroom units." The building can house up to twenty-five residents. She designed the commercial component to face Gottingen Street. There is a bus shelter, grocery store, and bathrooms integrated into the Gottingen Street façade. Anelo believes the courtyard is important

[63] Chioma Velma Anelo, "Reconsidering Rehabilitative Environments: Transitional Housing for Recovering Drug Addicts" (Dalhousie Univeristy, 2007), 44.

because it creates a connection between the multiple social spaces.[64] The courtyard introduces a social gathering space, important for transitional housing. The social core extrudes through the building connecting the housing units, market housing units, and the commercial program. The social core includes spaces like a café, laundry mat, mailroom, reading room, exercise rooms, artist studio, and a winter garden.

The extracted information to be used towards the development of the SLH Design Guidelines are:

I. Physical Environment
   A. Locate next to public transportation.[65]
   B. Commercial/Residential typology.[66]
II. Social Environment
   A. Supportive surrounding neighborhood.[67]
III. Immediate Environment
   A. Design should encourage social interaction by incorporating spaces for hobbies and activity: courtyard, reading room, exercise rooms, and artist studio.[68]

2.4 What Did We Learn from Our Study on Sober Living Houses and Where Do We Go from Here? by Douglas L. Polcin, Rachael Korcha, Jason Bond, and Gantt Galloway

Polcin, Korcha, Bond, and Galloway studied 300 individuals entering two different types of SLH during an eighteen month period. They studied important social and environmental factors in Options Recovery Services (ORS) and Clean and Sober Transitional Living (CSTL). "ORS is an outpatient substance abuse treatment program located in Berkely, California."[69] ORS made SLH available to clients while they attend

[64] Ibid.
[65] Ibid.
[66] Ibid.
[67] Ibid.
[68] Ibid.
[69] Polcin Ed. D., Douglas L. et al., "What Did We Learn from Our Study on Sober Living Houses and Where Do We Go from Here?," ed. Alcohol Research Group Public Health Institute (California2010), 3.

an outpatient program. The majority of ORS's clients have low incomes and have a history of being homeless. Most residents use government assistance (general assistance or social security disability) to pay for their rent. CSTL is the transitional housing, prior to moving into SLH. To apply for CSTL, individuals must have started a recovery program. There are two phases in CSTL. Phase I is usually thirty to ninety days that provides residents a structured living. Residents have a curfew and required to attend twelve-step meetings, five times a week. This allows residents to adapt to the environment of a SLH. Phase II acts as a SLH. Curfews and twelve-step programs are reduced, which allows increased individual responsibility. This study concludes that "owners and operators of SLH should pay attention to factors that predict better alcohol and drug outcomes, including higher involvement in twelve-step meetings, lower alcohol and drug use in the social network, and lower psychiatric severity."[70] The research also suggests "recognizing stakeholder views that hinder and support SLH will be essential" to improve housing for recovering individuals.[71]

This research brings up important social environmental factors to include in the SLH design.

The extracted information to be used towards the development of the SLH Design Guidelines are:

I. Social Environment
   A. Counselors should have a higher involvement in meetings. [72]
   B. Supportive surrounding neighborhood (lower alcohol and drug consumption and accepting of this typology). [73]

[70] Ibid., 11.
[71] Ibid.
[72] Ibid.
[73] Ibid.

2.5 Affordable Housing for People with Alcohol and Other Drug Problems by Friedner D. Wittman

Wittman defines the differences between a home and a shelter. A home has five qualities that a shelter does not: personal security, privacy and personal expression, community and sociopetality, appearance and upkeep, and location.[74] Wittman suggests these five qualities should be employed when designing an affordable alcohol and drug free (ADF) housing "to give recovering people a fair chance to stay sober in a home of their own."[75]

Personal security "is the combination of material protection against natural elements and psychological protection against intruders."[76] Intruders can include "strangers, neighbors, unwanted visitors, and even family members."[77] To include personal security to the immediate environment, architectural elements should impose "oversight of the front door."[78] If, the ADF housing is a larger facility, "a staffed front door and perimeter security are vital."[79] These architectural features will assure residents of no intruders.[80] To include personal security on a social level, ADF housing residents should have oversight "in accepting new residents and in evicting troublesome ones."[81]

Privacy and personal expression are elements in a house that should also be included in an ADF housing. The immediate environment should "hold the capacity to control unwanted interruptions from other people or any other source."[82] Wittman

[74] Wittman, "Affordable Housing for People with Alcohol and Other Drug Problems," 541.
[75] Ibid., 555.
[76] Ibid., 556.
[77] Ibid.
[78] Ibid.
[79] Ibid.
[80] Ibid.
[81] Ibid.
[82] Ibid., 557.

suggests the bedroom should be the private space and can also be the place for personal expression. To add personal expression into the immediate environment, Wittman suggests "allowing people to put things on the walls, by encouraging the display of personal photos and mementos, and by letting residents arrange furniture and furnishings." [83]

The community of the ADF housing is critical for recovering individuals. Wittman states that the immediate environment should encourage social interaction amongst the residents "to practice the arts of sober living in a mutual aid setting and to overcome isolation, alienation, and depression."[84] Wittman suggests adding areas for planned meetings and places for informal meetings. Informal meetings can occur in a "nook or side area where people can sit or stop to chat and also in wide corridors."[85] Wittman is an advocate of a sociopetal facility or a facility with an open circulation system. The open circulation system "encourages people to make contact with each other, to socialize, to greet to each other, to notice one another during the day."[86]

Wittman states requiring recovering individuals to constantly up keep an impossible house to clean is "depressing and draining." The ADF housing should invest in "high-quality appliances and fixtures", "particularly to building shell, utilities, bathrooms, and kitchens – the areas that get the hardest use and most wear." When appliance and fixtures do need repair, expedited repair is important to maintain a well-kept milieu.[87]

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[83] Ibid.
[84] Ibid., 558.
[85] Ibid.
[86] Ibid., 559.
[87] Ibid., 560-561.

The location of the ADF housing should be convenient for the residents. Firstly, the surrounding neighborhood should be "safe and economically stable."[88] Secondly, affordable ADF housing should be placed "close to public transportation."[89]

Wittman's explanation of the differences between a home and a shelter are important design factors to include in SLH.

The extracted information to be used towards the development of the SLH Design Guidelines are:

I. Physical Environment
   A. Locate next to public transportation. [90]

II. Social Environment
   A. Include residents in the acceptance and eviction process. [91]
   B. Safe and economically stable surrounding neighborhood. [92]

III. Immediate Environment
   A. View of the front door (small development) or security staff at front door (big development) to ensure no intruders. [93]
   B. SROs are encouraged. [94]
   C. Allow residents to post mementos on their walls to encourage personal expression. [95]
   D. Design should encourage social interaction: wide corridors, spaces for formal and informal meetings. [96]
   E. Invest in durable material, furniture, and appliances to maintain up-kept milieu, especially for the building shell, bathrooms and kitchens. [97]

[88] Ibid., 561.
[89] Ibid.
[90] Ibid.
[91] Ibid.
[92] Ibid., 561.
[93] Ibid, 556.
[94] Ibid., 557.
[95] Ibid.
[96] Ibid., 559.
[97] Ibid, 560.

2.6 Mental and Behavioral Health Environments: Critical Considerations for Facility Design by Mardelle McCuskey Shepley, Angela Watson, Francis Pitts, Anne Garrity, Elizabety Spelman, and Janhawi Kelkar

Mardelle Shepley and colleagues developed a set of design guidelines dedicated toward mental and behavioral facilities. Although Shepley's research is targeted toward psychiatric facilities, her proposed design guidelines for similar building typology are useful towards the development of the SLH Design Guidelines.

Shepley and colleagues conducted an extensive literature review to narrow down seventeen important factors. The seventeen important factors were used for the interviews. They interviewed were between mental behavioral practitioners. According to Shepley, the interviews concluded six out of the seventeen factors to be the most important and should be incorporated in a mental and behavioral facility.

Although, Shepley's proposed design guidelines are only focused on the immediate environment, these factors are still applicable to SLH. The immediate environmental factors include "design a deinstitutionalized milieu, provide attractive and maintainable furniture, design features should support the safety of patients and staff, design areas for staff respite, encourage orderly and organized space, and provide visual and physical access to nature." [98]

The extracted information to be used towards the development of the SLH Design Guidelines are:

I. Immediate Environment
   A. Deinstitutionalized milieu[99]
   B. Attractive and easily maintainable furniture[100]
   C. Staff respite[101]

[98] Mardelle Mccuskey Shepley et al., "Mental and Behavioral Health Environments: Critical Considerations for Facility Design," *General Hospital Psychiatry* 42 (2016): 20.
[99] Ibid.
[100] Ibid.
[101] Ibid.

D. Access to nature[102]

2.7 Conclusion

Although most researchers chose to focus on one environmental factor compared to all three (the physical environment, the social environment, and the immediate environment), the consolidation of this existing research presents a tentative list of the SLH Design Guidelines that covers all environments.

The compiled information from the preceding research to be used towards the development of the SLH Design Guidelines are:

I. Physical Environment
   A. Locate in a pedestrian-oriented location to increase social interaction.[103]
   B. Location next to public transportation. [104]
   C. Commercial/Residential typology. [105]
II. Social environmental factors:
   A. Supportive, safe, and economically stable surrounding neighborhood. [106]
   B. Counselors should have a higher involvement in meetings.[107]
   C. Include residents in the acceptance and eviction process.
III. Immediate Environmental Factors:
   A. Design should encourage social interaction by incorporating wide corridors and spaces for hobbies, activities, spaces for formal and informal meetings. [108]
   B. View of the front door (small development) or security staff at front door (big development) to ensure no intruders. [109]
   C. SROs are encouraged. [110]
   D. Allow residents to post mementos on their walls to encourage personal expression. [111]

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[102] Ibid.
[103]Carter, "Physical Landscape/Mental Landscape: Mental Health, Architecture and the City", 37.
[104] Ibid.; Wittman, "Affordable Housing for People with Alcohol and Other Drug Problems," 561.
[105] Anelo, "Reconsidering Rehabilitative Environments: Transitional Housing for Recovering Drug Addicts", 44.
[106] Wittman, "Affordable Housing for People with Alcohol and Other Drug Problems," 561.; Ed. D. et al., "What Did We Learn from Our Study on Sober Living Houses and Where Do We Go from Here?," 11.
[107] Ibid.
[108] Wittman, "Affordable Housing for People with Alcohol and Other Drug Problems," 559-61.; Anelo, "Reconsidering Rehabilitative Environments: Transitional Housing for Recovering Drug Addicts", 44.
[109] Wittman, "Affordable Housing for People with Alcohol and Other Drug Problems," 556.
[110] Ibid., 557.
[111] Ibid.

E. Invest in durable material, furniture, and appliances to maintain up-kept milieu, especially for the building shell, bathrooms and kitchens. [112]
F. Spaces should have multiple sources of light. [113]
G. Transition zones should be created in between spaces, within a space, and for windows. [114]
H. Deinstitutionalized milieu[115]
I. Staff respite[116]
J. Access to nature[117]

[112] Ibid., 560.; Shepley et al., "Mental and Behavioral Health Environments: Critical Considerations for Facility Design," 20.
[113] Youssef, "Therapeutic Architecture Design Index," 3-8.
[114] Ibid.
[115] Shepley et al., "Mental and Behavioral Health Environments: Critical Considerations for Facility Design," 20.
[116] Ibid.
[117] Ibid.

Chapter 3: Sand Island Treatment Center Case Study

3.1 Research Method

SITC's staff housing was analyzed through site visits and interviews. The key finding from the site visit was the discovery of SITC's free staff housing available for, which became the main topic of the interviews. Common themes brought up in the interviews, related to SITC staff housing will determine important factors to include in the SLH Design Guidelines.

3.2 Existing Conditions

This information includes material relating to all existing environmental factors that was derived from the site visit, interviews, and zoning and planning data.

The Existing Physical Environment

SITC is located on Sand Island in the Nu'uanu watershed.[118] It is zoned as I-3 Waterfront Industrial District.[119] It is in a tsunami evacuation zone.[120] Sand Island State Recreation Area Park is in walking distance, but is poorly maintained. The closest bus stop is Nimitz Highway and Sand Island Access Road (bus stop 975), which is a forty-one minute walk or an eleven minute bike ride.

[118] "Flood Hazard Assessment Tool," http://gis.hawaiinfip.org/FHAT/.
[119] "Parcel & Zoning Information," http://cchnl.maps.arcgis.com/apps/Viewer/index.html?appid=bc24f3eb50f94f698d830aed9c428548.
[120] Ibid.

Figure 1: Context of SITC
Source: Data collected from Department of Planning and Permitting.[121] Background image from Google maps, Map data @ 2018.[122] Graphic made by author.

[121] "Department of Planning & Permitting, Online Service for Online Geographic Information System Maps of Honolulu," http://www.honoluludpp.org/OnlineServices/OnlineGISMaps.aspx.
[122] Google Maps, "Sand Island," https://www.google.com/maps/search/google+maps/@21.3128985,-157.8811236,7607m/data=!3m1!1e3.

Although there were no complaints, evidently, the unfortunate physical location of SITC puts human health in danger. The adjacent wastewater treatment facility can cause adverse health effects to residents and staff of SITC. According to Nellie J. Brown's research, the use of "weirs, aerated tanks, dewatering processes, and sludge processes (drying, compacting, and incineration)" can cause air-stripping of chemicals and diseases, inducing exposure through inhalation.[123] The Sand Island wastewater treatment facility has everything stated, located on the site.[124] During dewatering processes, aerosol droplets are formed and ejected into the air. The survival and spread of organisms and pathogens in aerosol droplets relies heavily on environmental factors, such as wind, relative humidity, temperature, and sunlight.[125] During the interviews, the low quality of noise became clear. The Honolulu International Airport is very close; only five miles away. The prevailing noise of planes passing by is a form of noise pollution. Noise causes annoyance and exposed people "may experience a variety of negative responses, such as anger, disappointment, dissatisfaction, withdrawal, helplessness, depression, anxiety, distraction, agitation, and exhaustion, and psychological symptoms such as tiredness, stomach discomfort and stress."[126]

Although there are harmful effects from the wastewater treatment facility and the airport, the interviewees shared positive information about SITC's physical environment. Interviewees unanimously agreed that living on site as a counselor is very convenient. It is their own choice to live on site. The live-work environment allows counselors to focus

[123] Nellie J. Brown, "Health Hazard Manual: Wastewater Treatment Plant and Sewer Workers," (Itaca, NY: Cornell University, Workplace Health and Safety Program, 1997), 3.
[124] Conversation with a Sand Island Wastewater Treatment Facility worker, December 1, 2017.
[125] Brown, "Health Hazard Manual: Wastewater Treatment Plant and Sewer Workers," 6.
[126] Interview with SITC counselor, November 1, 2017.

on maintaining their sobriety, by not having to worry about the stressors of rent and transportation. Living on site for free, allows recently recovered individuals the chance to save their money in order to begin a life again. The live-work environment maintains an organized schedule that on-site counselors have to follow, which is important to maintaining sobriety.

Convenient access to healthcare is provided to SITC staff with on-site doctors. The on-site doctors are also allowed to give referrals to necessary doctors who are unavailable to visit the site.

The Existing Social Environment

The interviews revealed essential information about the existing social environment. SITC has a successful social cohesion. The counselors are very trusting of each other and with their clients. During the interview, one of the counselors stated counselors hold a high level of authority because many of the clients are court-ordered to attend SITC. If clients are court-ordered, they need to leave SITC with a clinical discharge that states the program was completed. This motivates good behavior in clients, and in return less stress on counselors.

During treatment, SITC allows individuals to grow and progress in their lives, which is another positive factor of social cohesion. The second phase of treatment allows individuals to rejoin the community by obtaining a full-time job and applying their new learned social skills. The requirement of holding a full-time job is not about making money, it is about becoming reliable and developing consistency.[127] SITC requires all

[127] Interview with SITC counselor, November 1, 2017.

clients in the second phase of treatment to start a savings account, with the intent to be prepared for life after treatment is completed. The SITC internship (also during treatment) allows the interns a chance to grow, which creates a sense of belonging. The interns are asked to take on a huge responsibility. Interns need to complete SITC's required duties and look after their own group of clients. Interns make sure their group stays on schedule and the daily duties are completed.[128]

Counselors who live on site appreciate the structured community. The structured community allows individuals to keep on tract with their sobriety. One of the counselors stated becoming a counselor helped with maintaining sobriety by helping other individuals overcome their addiction. Everyone at SITC is working towards the same goal, and having the accessibility to supporting peers is important.

Staff bonding is important to SITC staff. It is something staff members look forward to. Every Saturday, there is staff movie night in the main office. Occasionally, staff members take their team out on staff boding excursions. This staff bonding creates a cohesive community.[129]

All interviewed counselors are very passionate about their hobbies. All interviewees stay busy and active, with both mental and physical hobbies. When counselors are not working, they are staying busy with their hobbies.

[128] Interview with SITC counselor, November 1, 2017.
[129] Interview with SITC counselor, November 1, 2017.

The Existing Immediate Environment

According to their (SITC) plan, there are twenty-six structures. The twenty-six existing structures were renovated and divided into many smaller substructures. Some of the existing structures are remains of the prisoners of war (POW) camp, dating back to the 1940s.[130] After, the POW camp was closed in 1943,[131] homeless population took advantage of the abandoned structures.[132] It is unknown when and how the property was donated to SITC. The Department of Planning and Permitting (DPP) does not have any building permits regarding SITC structures, only plumbing and electrical work in 1991 and 1998 show up for project name "HI ALCOHOLISM FND" owned by City and County HI Alcoholism and "Alcoholism Found" owned by Alcoholism Foundation.[133] The newer structures are refurbished shipping containers reserved for counselor housing, staff offices, and storage.

SITC is a large facility with 150 clients.[134] The facility is gated with a secured entrance. Staff is always guarding the gate to keep out unwanted visitors. All guests need to have approval upon access.

The lack of privacy and physical separation between counselors and clients seemed to be a reoccurring issue between all interviewees. During their internship, interviewees stated it was very hard to establish downtime due to the lack of physical separation between both parties. Interviewees stated, clients would pass by the intern

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[130] Conversation with a SITC counselor, October 18, 2017.
[131] "Sand Island (Detention Facility) | Densho Encyclopedia," http://encyclopedia.densho.org/Sand%20Island%20%28detention%20facility%29/.
[132] Interview with a counselor, October 18, 2017.
[133] City and County of Honolulu Department of Planning and Permitting, "Honolulu Internet Permit System - Building Permit Search," http://dppweb.honolulu.gov/DPPWeb/Default.aspx?PossePresentation=BuildingPermitSearch.
[134] Conversation with a SITC counselor, October 18, 2017.

dorms demanding their need and attention, during interns' off time, resulting in an on-call schedule.

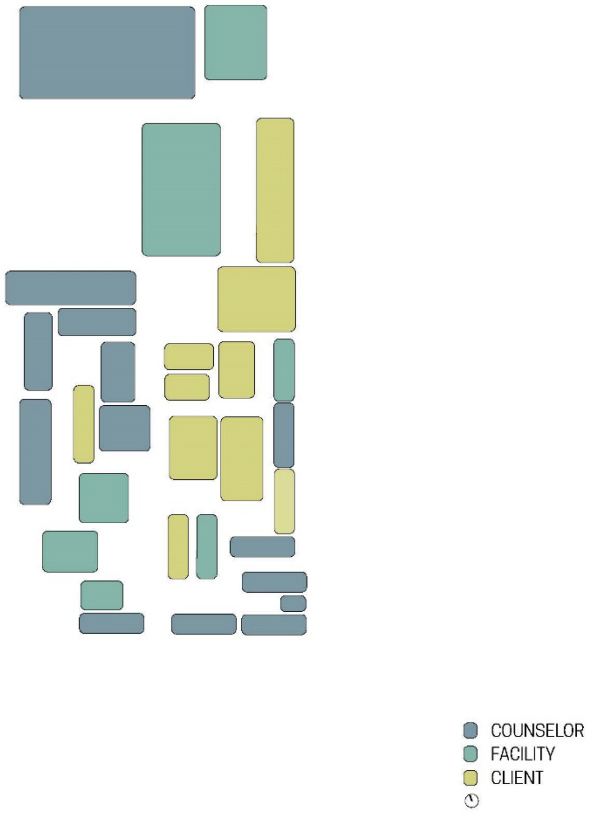

Figure 2: SITC Spatial Diagram

This also brought up another important discovery of SITC, there is no staff break room. Although, interviewees did not complain of the absent staff break room, existing research has stated the importance of a staff break room.[135] Interviewees stated they find retreat in their individual offices or in their single-room occupancy (SRO) dorms. Counselors who

[135] Shepley et al., "Mental and Behavioral Health Environments: Critical Considerations for Facility Design," 20.

live on site have their own private room where they are allowed to decorate and populate to their liking. Counselor housing is also available until the individual is ready to leave.

The length of stay is up to the individual. An interviewee stated many of the people in treatment do not have a home to return to, either because their home is a bad environment (family members are also users), individuals lost all of their good relationships due to their addiction, or there is no home.[136] This housing option allows individuals to enter back into society on their own terms.

3.3 Conclusion

The relevant and positive information extracted from the interviews relating to the physical environment, the social environment, and the immediate environment are important towards the development of the SLH Design Guidelines. SITC has recognizable features that should be identified in SLH design. For example, SITC staff housing displays successful qualities in all three environments. The free and on-site staff housing provides a very convenient location, which also retains a structured environment that is good for individuals who recently completed treatment. The on-site doctor that is available to all SITC staff, makes healthcare very accessible and convenient. SITC provides a successful social environment by maintaining a supportive and cohesive community. The unlimited stay allows the individual to focus on maintaining their sobriety, and return back to society on their own time. The demanding

[136] Interview with a counselor, November 1, 2017.

and on-call schedule resulted from the lack of physical privacy between staff and client, which verified the need and importance of this quality.

The important information extracted to be used towards the development of the SLH Design Guidelines are:

I. Physical Environment
   A. Convenient location; accessible to healthcare.
   B. Live-work environment.
II. Social Environment
   A. Supportive community with positive and influential peers
   B. Keep busy with a hobby
III. Immediate Environment
   A. Establish a physical separation between work (public) and life (private)
   B. Importance of privacy
   C. Unlimited stay
   D. SRO

Chapter 4: Design Guidelines

Finally, this chapter offers the SLH Design Guidelines that covers the physical environment, the social environment, and the immediate environment.

4.1 Research Method

The methodology used to produce the SLH Design Guidelines for recovering individuals is the combination of analyzed information extracted from existing research and the SITC case study.

Chapter 1 presented physical environmental factors and social environmental factors. The physical environmental factors relate to (1) the built environment and (2) air quality.[137] The social environmental factors associate to (1) the type, quality, and stability of social connections.[138]

I. Physical Environment
   A. Built Environment
      1. Access to transportation[139]
      2. Access to health and social services[140]
   B. Air Quality[141]
II. Social Environment
   A. Type, quality, and stability of social connections[142]

The conclusion of Chapter 2 presented relevant material pertaining to all three environmental factors. The physical environmental factors extracted from existing research include: (1) locate in a pedestrian-oriented location[143], (2) locate next to public

[137]Woolf et al., *U.S. Health in International Perspective : Shorter Lives, Poorer Health*, 195.
[138] Ibid., 196.
[139] Woolf et al., *U.S. Health in International Perspective : Shorter Lives, Poorer Health*, 195.
[140] Ibid.
[141] Ibid., 193.
[142] Ibid., 196.
[143] Carter, "Physical Landscape/Mental Landscape: Mental Health, Architecture and the City", 37.

transportation[144], and (3) to be a commercial/residential typology.[145] The social environmental factors are: (1) locate in a supporting neighborhood[146] (2) higher counselor involvement[147] and (3) include residents in the acceptance and eviction process.[148] The immediate environmental factors are: (1) design should encourage social interaction,[149] (2) view of the entrance,[150] (3) SROs are encouraged,[151] (4) encourage personal expression,[152] (5) invest in durable material, furniture, and appliances,[153] (6) spaces should have multiple sources of light,[154] (7) incorporate transition zones between spaces,[155] (8) deinstitutionalized milieu,[156] (9) include space for staff respite,[157] (10) provide visual and physical access to nature.[158]

I. Physical Environment
   A. Locate in a pedestrian-oriented location to increase social interaction.[159]
   B. Location next to public transportation. [160]
   C. Commercial/Residential typology. [161]
II. Social environmental factors:
   A. Supportive, safe, and economically stable surrounding neighborhood. [162]

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[144] Ibid.,37.;Wittman, "Affordable Housing for People with Alcohol and Other Drug Problems," 561.
[145] Ibid.
[146] Ibid.; Ed. D. et al., "What Did We Learn from Our Study on Sober Living Houses and Where Do We Go from Here?," 11.
[147] Ibid.
[148] Wittman, "Affordable Housing for People with Alcohol and Other Drug Problems," 571.
[149] Ibid., 561; Anelo, "Reconsidering Rehabilitative Environments: Transitional Housing for Recovering Drug Addicts", 44.; Wittman, "Affordable Housing for People with Alcohol and Other Drug Problems," 559.
[150] Ibid, 556.
[151] Ibid., 557.
[152] Ibid.
[153] Ibid, 560.; Shepley et al., "Mental and Behavioral Health Environments: Critical Considerations for Facility Design," 20.
[154] Youssef, Omar. "Therapeutic Architecture Design Index." Arizona: University of Arizona, 2014 (3-8).
[155] Ibid.
[156] Shepley, Mardelle Mccuskey, Angela Watson, Francis Pitts, Anne Garrity, Elizabeth Spelman, Janhawi Kelkar, and Andrea Fronsman. "Mental and Behavioral Health Environments: Critical Considerations for Facility Design." *General Hospital Psychiatry* 42 (2016): 20.
[157] Ibid.
[158] Ibid.
[159]Carter, "Physical Landscape/Mental Landscape: Mental Health, Architecture and the City", 37.
[160] Ibid.; Wittman, "Affordable Housing for People with Alcohol and Other Drug Problems," 561.
[161] Anelo, "Reconsidering Rehabilitative Environments: Transitional Housing for Recovering Drug Addicts", 44.
[162] Wittman, "Affordable Housing for People with Alcohol and Other Drug Problems," 561.; Ed. D. et al.,

B. Counselors should have a higher involvement in meetings.[163]
C. Include residents in the acceptance and eviction process.

III. Immediate Environmental Factors:

A. Design should encourage social interaction by incorporating wide corridors and spaces for hobbies, activities, spaces for formal and informal meetings. [164]
B. View of the front door (small development) or security staff at front door (big development) to ensure no intruders. [165]
C. SROs are encouraged. [166]
D. Allow residents to post mementos on their walls to encourage personal expression. [167]
E. Invest in durable material, furniture, and appliances to maintain up-kept milieu, especially for the building shell, bathrooms and kitchens. [168]
F. Spaces should have multiple sources of light. [169]
G. Transition zones should be created in between spaces, within a space, and for windows. [170]
H. Deinstitutionalized milieu[171]
I. Staff respite[172]
J. Access to nature[173]

Chapter 3: SITC Case Study, presented all three environmental factors (the physical environment, the social environment, and the immediate environment). Analyzed information from the SITC site visit and interviews suggest environmental factors specifically relating to SLH. The physical environmental factors include: (1) convenient location and (2) a live-work environment. The social environmental factors are: (1) having a supportive community and (2) to acquire a hobby. The immediate

"What Did We Learn from Our Study on Sober Living Houses and Where Do We Go from Here?," 11.
[163] Ibid.
[164] Wittman, "Affordable Housing for People with Alcohol and Other Drug Problems," 559-61.; Anelo, "Reconsidering Rehabilitative Environments: Transitional Housing for Recovering Drug Addicts", 44.
[165] Wittman, "Affordable Housing for People with Alcohol and Other Drug Problems," 556.
[166] Ibid., 557.
[167] Ibid.
[168] Ibid., 560.; Shepley et al., "Mental and Behavioral Health Environments: Critical Considerations for Facility Design," 20.
[169] Youssef, "Therapeutic Architecture Design Index," 3-8.
[170] Ibid.
[171] Shepley et al., "Mental and Behavioral Health Environments: Critical Considerations for Facility Design," 20.
[172] Ibid.
[173] Ibid.

environmental factors are: (1) to establish a physical separation between counselor and client, (2) the importance of a staff retreat room[174], and (3) unlimited stay until individual is ready to leave.

The important information extracted to be used towards the development of the SLH Design Guidelines are:

I. Physical Environment
   A. Convenient location; accessible to healthcare.
   B. Live-work environment.
II. Social Environment
   A. Supportive community with positive and influential peers
   B. Keep busy with a hobby
III. Immediate Environment
   A. Establish a physical separation between work (public) and life (private)
   B. Importance of privacy
   C. Unlimited stay
   D. SRO

The important factors extracted from each chapter contribute to the complete design guidelines for SLH. Each chapter states the relevance and the importance of each factor. The factors important to the physical environment, the social environment, and the immediate environment are the design guidelines.

The housing for recovering individuals shall incorporate all physical, social, and immediate environmental factors that were extracted from Chapter 1, 2, and 3. These factors have been proven to affect human health and simultaneously support individuals' sobriety.

[174] Shepley et al., "Mental and Behavioral Health Environments: Critical Considerations for Facility Design," 20.

4.2 SLH Design Guidelines

I. Physical Environment
   A. Convenient and accessible location that promotes health
      1. Access to health-related resources: healthcare, social services
      2. Access to transportation and/or public transportation[175]
      3. Street connectivity[176]
      4. Pedestrian-oriented location to increase social interaction[177]
      5. Live-work typology
II. Social Environment
   A. Type, quality, and stability of social connections[178]
   B. Successful and supporting social environment[179]
      1. Social interaction
         a) Acquire a hobby
      2. Social control
         a) Include residents in the acceptance and eviction process.[180]
      3. Sense of security and ease
      4. Organizational ties
      5. Collective identity and sense of place
      6. Socialization
III. Immediate Environment
   A. Unlimited stay
   B. Design should encourage social interaction[181]
      1. Incorporate wide corridors[182]
      2. Spaces for hobbies, activities, spaces for formal and informal meetings. [183]
      3. Access to nature[184]
   C. Establish privacy
      1. Provide physical separation between public and private spaces
      2. SROs[185]
   D. Design induces sense of security

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[175] Carter, "Physical Landscape/Mental Landscape: Mental Health, Architecture and the City", 37.; Wittman, "Affordable Housing for People with Alcohol and Other Drug Problems," 561.
[176] Evans, "Environmental Stress," 55.
[177] Carter, "Physical Landscape/Mental Landscape: Mental Health, Architecture and the City", 37.
[178] Woolf et al., *U.S. Health in International Perspective : Shorter Lives, Poorer Health*, 196.; Wittman, "Affordable Housing for People with Alcohol and Other Drug Problems," 561.; Ed. D. et al., "What Did We Learn from Our Study on Sober Living Houses and Where Do We Go from Here?," 11.
[179] Evans, "Environmental Stress," 288-89.
[180] Wittman, "Affordable Housing for People with Alcohol and Other Drug Problems," 571.
[181] Ibid., 561.; Anelo, "Reconsidering Rehabilitative Environments: Transitional Housing for Recovering Drug Addicts", 44.; Wittman, "Affordable Housing for People with Alcohol and Other Drug Problems," 559.
[182] Ibid.
[183] Ibid.
[184] Shepley et al., "Mental and Behavioral Health Environments: Critical Considerations for Facility Design," 20.
[185] Wittman, "Affordable Housing for People with Alcohol and Other Drug Problems," 557.

1. View of the front door (small development) [186]
2. Security staff at front door (big development) to ensure no intruders.[187]
3. Provide exterior light during night time.

E. Design for autonomy and a deinstitutionalized milieu[188]
1. SROs are encouraged. [189]
2. Allow residents to post mementos on their walls to encourage personal expression. [190]

F. Well-maintained environment
1. Invest in durable material, furniture, and appliances to maintain an up-kept appearance, especially for the building shell, bathrooms and kitchens [191]
2. Schedule regular maintenance [192]
3. Repair any broken accessories, immediately [193]
   a) Provide storage space[194]
   b) Include a maintenance shop[195]

G. Light
1. Spaces should have multiple sources of light [196]
2. Transition zones should be created in between spaces, within a space, and for windows[197]

The Physical Environment Design Guidelines (PEDG)

I. Physical Environment
A. Convenient and accessible location that promotes health
1. Access to health-related resources: healthcare, social services
2. Access to transportation and/or public transportation[198]
3. Street connectivity[199]
4. Pedestrian-oriented location to increase social interaction[200]
5. Live-work typology

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[186] Ibid.
[187] Ibid.
[188] Shepley et al., "Mental and Behavioral Health Environments: Critical Considerations for Facility Design," 20.
[189] Wittman, "Affordable Housing for People with Alcohol and Other Drug Problems," 557.
[190] Ibid.
[191] Ibid.; Shepley et al., "Mental and Behavioral Health Environments: Critical Considerations for Facility Design," 20.
[192] Wittman, "Affordable Housing for People with Alcohol and Other Drug Problems," 560.
[193] Ibid.
[194] Ibid., 561
[195] Ibid.
[196] Youssef, "Therapeutic Architecture Design Index," 3-8.
[197] Ibid.
[198] Carter, "Physical Landscape/Mental Landscape: Mental Health, Architecture and the City", 37.; Wittman, "Affordable Housing for People with Alcohol and Other Drug Problems," 561.
[199] Evans, "Environmental Stress," 55.
[200] Carter, "Physical Landscape/Mental Landscape: Mental Health, Architecture and the City", 37.

The physical environment of the housing must have a convenient and accessible location and must not be located on or near any toxic sites. The location of the housing must have access to health-related resources and access to public transportation. Accessibility also relates to street connectivity and walkability. The network of streets and paths should have "many short links, numerous intersections, and minimal dead-ends (cul-de-sacs)."[201]

The live-work or commercial-residential housing typology promotes structure and increases socialization for recovering individuals. The worries of transportation is avoided with this design solution, because traffic is known to cause stress. This typology, when correctly located, can also increase social interaction. It can connect recovering individuals to the surrounding community.[202]

To increase the accessibility of health-related resources, strategies should be implemented during site selection. Site analysis should highlight existing surroundings related to health. Health-related resources include: health care, health food stores, and parks. Urban design strategies "to promote health include modification of land use zoning, creation of more parks and recreational areas, redesign of accident-prone traffic intersections, and improve lighting to increase safety."[203]

Proximity to toxic sites should be avoided to increase human health and support sobriety. Studies of existing surrounding toxic sites should be completed prior to site

[201] Mike. Tresidder, "Using Gis to Measure Connectivity: An Exploration of Issues," (Portland, Oregon: Portland State University, 2005), 2.
[202] Anelo, "Reconsidering Rehabilitative Environments: Transitional Housing for Recovering Drug Addicts", 44.
[203] N. Freudenberg, "Health Promotion in the City: A Review of Current Practice and Future Prospects in the United States," *Annu. Rev. Public Health.* 21, no. 1 (2000): 484.

selection. Research to locate places that encourage recycling, walking, bicycling, and public transportation will decrease the chances of pollutants in the air. [204]

The Social Environment Design Guidelines (SEDG)

II. Social Environment
   A. Type, quality, and stability of social connections[205]
   B. Successful and supporting social environment[206]
      1. Social interaction
         a) Acquire a hobby
      2. Social control
         a) Include residents in the acceptance and eviction process.[207]
      3. Sense of security and ease
      4. Organizational ties
      5. Collective identity and sense of place
      6. Socialization

The social environment relates to the housing and the location. The housing must exist in a successful social environment. [208] The housing must also maintain the qualities of a successful social environment. Factors determining the success of the social environment include: social interaction, social control, sense of security and ease, organizational ties, collective identity and sense of place, and socialization. [209] Nicholas Freudenberg states a successful city offers a dense and diverse population, which "creates conditions for multiple social networks" to exist. [210] Density "offers multiple

[204] Ibid.
[205] Woolf et al., *U.S. Health in International Perspective : Shorter Lives, Poorer Health*, 196.; Wittman, "Affordable Housing for People with Alcohol and Other Drug Problems," 561.; Ed. D. et al., "What Did We Learn from Our Study on Sober Living Houses and Where Do We Go from Here?," 11.
[206] Evans, "Environmental Stress," 288-89.
[207] Wittman, "Affordable Housing for People with Alcohol and Other Drug Problems," 571.
[208] Evans, "Environmental Stress," 288-89.
[209] Ibid.
[210] Freudenberg, "Health Promotion in the City: A Review of Current Practice and Future Prospects in the United States," 479.

opportunities for meeting new people and finding like-minded peers, escaping restrictions on freedom, and finding excitement and stimulations."[211]

The availability and accessibility to peers determines the success of social interaction.[212] Recovering individuals should acquire a hobby to increase the chances of social interaction amongst other individuals with similar interests.

To incorporate social control within the housing, residents should be given the opportunity to make house decisions. Having the ability to control the social environment results in qualities of security and ease. House decisions can include the acceptance and eviction process of residents.[213] To develop a sense of security and ease within the surrounding context, the location of the housing should exist in a neighborhood with low crime rates and low drug and alcohol use.

To integrate organizational ties into the housing, the inclusion of regular meetings is important. This can also permit growth amongst residents, resulting in a successful form of socialization. Organizational ties relating to the surrounding context can include accessibility to "locality-based institutions, neighborhood associations, and church groups."[214] The accessibility to these organizations increases the chance of social interaction.

A collective identity and sense of place, in regards to the housing relate more towards the interior architecture. Living in a housing that has nice furnishing and is well-maintained allows individuals to feel positive about their social status. [215] A sense of

[211] Ibid., 478.
[212] Evans, "Environmental Stress," 288-89.
[213] Wittman, "Affordable Housing for People with Alcohol and Other Drug Problems," 561.
[214] Evans, "Environmental Stress," 288-89.
[215] Wittman, "Affordable Housing for People with Alcohol and Other Drug Problems," 560.

place relating to the location is the same, but on the bigger-exterior context. The city or town must have something the resident can feel proud of.

The Immediate Environment Design Guidelines (IEDG)

III. Immediate Environment
- A. Unlimited stay
- B. Design should encourage social interaction[216]
  1. Incorporate wide corridors[217]
  2. Spaces for hobbies, activities, spaces for formal and informal meetings [218]
  3. Access to nature[219]
- C. Establish privacy
  1. Provide physical separation between public and private spaces
  2. SROs[220]
- D. Design induces sense of security
  1. View of the front door (small development) [221]
  2. Security staff at front door (big development) to ensure no intruders.[222]
  3. Provide exterior light during night time
- E. Design for autonomy and a deinstitutionalized milieu[223]
  1. SROs are encouraged [224]
  2. Allow residents to post mementos on their walls to encourage personal expression [225]
- F. Well-maintained environment
  1. Invest in durable material, furniture, and appliances to maintain an up-kept appearance, especially for the building shell, bathrooms and kitchens [226]
  2. Schedule regular maintenance [227]
  3. Repair any broken accessories, immediately [228]

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[216] Ibid., 561.; Anelo, "Reconsidering Rehabilitative Environments: Transitional Housing for Recovering Drug Addicts", 44.; Wittman, "Affordable Housing for People with Alcohol and Other Drug Problems," 559.
[217] Ibid.
[218] Ibid.
[219] Shepley et al., "Mental and Behavioral Health Environments: Critical Considerations for Facility Design," 20.
[220] Wittman, "Affordable Housing for People with Alcohol and Other Drug Problems," 557.
[221] Ibid.
[222] Ibid.
[223] Shepley et al., "Mental and Behavioral Health Environments: Critical Considerations for Facility Design," 20.
[224] Wittman, "Affordable Housing for People with Alcohol and Other Drug Problems," 557.
[225] Ibid.
[226] Ibid.; Shepley et al., "Mental and Behavioral Health Environments: Critical Considerations for Facility Design," 20.
[227] Wittman, "Affordable Housing for People with Alcohol and Other Drug Problems," 560.
[228] Ibid.

a) Provide storage space[229]
b) Include a maintenance shop[230]

G. Light
1. Spaces should have multiple sources of light[231]
2. Transition zones should be created in between spaces, within a space, and for windows[232]

The immediate environment of the housing must include the following seven design strategies to provide a healthy and sober environment: privacy, unlimited stay, encourage social interaction, induce security, encourage autonomy and a deinstitutionalized milieu, well-maintained environment, and light design. [233]

Unlimited stay must be an option for this type of housing. Recovering individuals often are homeless or do not have a clean home to return to. Individuals right out of treatment, often do not have the stability financially to pay for housing or transportation. This quality will give individuals the opportunity to return back to society when they are ready socially, mentally, and financially.

The architecture must encourage social interaction. [234] Design features such as wide corridors, spaces for hobbies, informal and formal meetings, [235] and access to nature stimulates socialization.[236] The physical and visual access to nature can introduce

[229] Ibid., 561
[230] Ibid.
[231] Youssef, "Therapeutic Architecture Design Index," 3-8.
[232] Ibid.
[233] Wittman, "Affordable Housing for People with Alcohol and Other Drug Problems," 561.; Anelo, "Reconsidering Rehabilitative Environments: Transitional Housing for Recovering Drug Addicts", 44.; Wittman, "Affordable Housing for People with Alcohol and Other Drug Problems," 559.; Shepley et al., "Mental and Behavioral Health Environments: Critical Considerations for Facility Design," 20.
[234] Wittman, "Affordable Housing for People with Alcohol and Other Drug Problems," 561.; Anelo, "Reconsidering Rehabilitative Environments: Transitional Housing for Recovering Drug Addicts", 44.; Wittman, "Affordable Housing for People with Alcohol and Other Drug Problems," 559.
[235] Ibid., 558.
[236] Shepley et al., "Mental and Behavioral Health Environments: Critical Considerations for Facility Design," 20.

an exterior courtyard that will encourage social interaction between housing members. The courtyard can also be used for informal meetings.

Privacy is important to create a healthy immediate environment. If the building type is a development that offers commercial and residential spaces, a separation between work and life must be established. This decision must be made during the planning phase. If the building type is a commercial-residential, privacy for residents must be incorporated into the design. Residency should be designed to be visually and/or physically separated from the commercial side. Residents need a private space to manage undesired interferences. [237] Single-room occupancies (SROs) are encouraged to introduce this private space. [238]

The housing must encourage a sense of security. A sense of security can be created by providing views of the entrance. If the housing is a residential type, view of the front door will generate the feeling of being secure. If the housing is part of a large facility or a commercial typology, security can be introduced by incorporating a secured entrance and perimeter by assigning staff to over watch intruders. [239] Providing a well-lit exterior will also provide security during night time.

To design a deinstitutionalized milieu, autonomy and personal expression must be encouraged. Autonomy can be incorporated by including spaces for hobbies, such as kitchens and computer rooms. [240] Housing managers must allow residents to make their

[237] Wittman, "Affordable Housing for People with Alcohol and Other Drug Problems," 557.
[238] Ibid.
[239] Ibid., 556.
[240] Shepley et al., "Mental and Behavioral Health Environments: Critical Considerations for Facility Design," 18.

housing feel like a home. Allowing residents to decorate their own rooms by rearranging furnishings and displaying personal mementos will make it feel like home.[241]

The housing must be well-kept and in good condition. Investing in durable equipment and furnishings is important to maintaining a well-maintained appearance. [242] Investments should be made for materials, furnishings, and appliances in the building shell, kitchen, and bathrooms due to their high use and exhaustion rates.[243] Developing a regular maintenance schedule is necessary in order to keep the housing well-maintained.[244] Immediate repair of broken or damaged equipment, furnishing, and appliances must be enforced.[245] This also suggests required space for storage and maintenance. [246] The storage is necessary to temporarily put aside the broken or damaged items. [247] The maintenance shop should be designed for enough space to do repairs, store equipment for repairs, and extra storage of damaged items. [248]

Lighting design is important to make humans feel comfortable. Transition zones and multiple sources of light are important to integrate into the design.[249] Transition zones must be incorporated into the immediate environment to decrease glare and discomfort. [250] Transition zones can include lighting design, fenestration design, and interior architectural elements. Interior architectural elements can include different use of

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[241] Wittman, "Affordable Housing for People with Alcohol and Other Drug Problems," 557.
[242] Ibid.; Shepley et al., "Mental and Behavioral Health Environments: Critical Considerations for Facility Design," 20.
[243] Wittman, "Affordable Housing for People with Alcohol and Other Drug Problems," 560.
[244] Ibid.
[245] Ibid.
[246] Ibid., 561.
[247] Ibid.
[248] Ibid.
[249] Youssef, "Therapeutic Architecture Design Index," 3-8.
[250] Ibid.

material and color that differentiate the change of space. The use of multiple sources of light involve artificial light and natural day light, that should balance the illuminance, which will result in a higher level of comfort.

These guidelines that cover the physical, social, and immediate environment must be included in the housing design to provide the recovering individuals with the best environment to maintain their sobriety.

4.3 Conclusion

In conclusion, these design guidelines should be used in order to design the most effective SLH to assist recovery and sobriety. The existing research displayed the absence of a complete set of design guidelines for SLH. The SLH Design Guidelines use the combination of analyzed research from environmental psychology, the SITC case study, and existing research to cover all factors that are known to affect human physical, social, and mental health. These design guidelines propose the integration of urban and architectural planning strategies to develop the most effective SLH design for sustained sobriety.

Part 2: Design

Part 2 demonstrates a design proposed for SLH implementing the above design guidelines. The PEDG (Physical Environment Design Guidelines) and the SEDG (Social Environment Design Guidelines) determined the site selection. The IEDG (Immediate Environment Design Guidelines) and collective housing precedents were used to create the Three-Floor Model.

Chapter 5: Site Selection

Beginning with the physical environment design guidelines, the whole island of O‘ahu was analyzed, by establishing locations where the majority of physical environmental factors (access to health and social services and access to public transportation) existed. Access to health and social services are important qualities of the physical environment because it directly affects human health and well-being. Access to public transportation is an important factor of the physical environment, because when recovering individuals are transitioning back into society, they do not have their own car and often rely on public transportation to get to their jobs or doctor appointments. Three sites were selected to further study in accordance to the physical and social environment design guidelines: Waipahu, King Street, and Kaneohe.

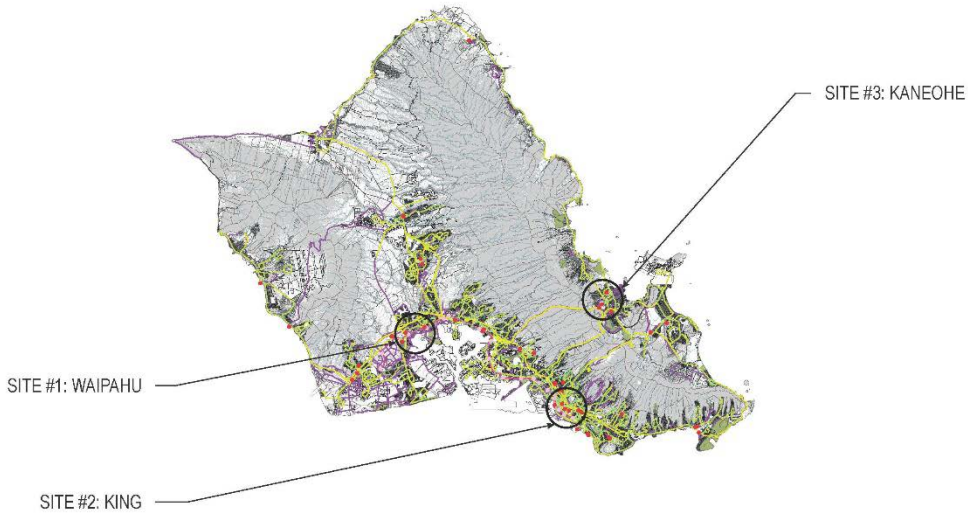

Figure 3: Selected Sites
Source: Data collected from Department of Planning and Permitting (DPP).[251] Graphic made by author.

[251] "Department of Planning & Permitting, Online Service for Online Geographic Information System Maps of Honolulu."

Qualities of the physical environment were measured by a series of maps and analyses, approximately within a mile radius or within a ten-minute walk. The mapping displays locations of existing health-related services, existing and Transient-Oriented Development (TOD) proposed public transportation, existing and Department of Transportation (DOT) proposed bike facilities, existing streets, and existing walkability, and the zoning. The measurement of health-related services, public transportation, and bike facilities were interpreted by the abundance and their adjacency to the site. The connection to these resources are just as important, so measuring the street connectivity and walkability of the neighborhood were essential. Street connectivity was measured by analyzing the existing streets by using Mike Tresidder's connectivity methodology of mapping "dangle nodes" and "real nodes," which displays the quality of street networks. "Dangle nodes are the endpoints of a link that has no other connections (a dead-end or cul-de-sac). Real nodes are the endpoints of a link that connects to other links (an intersection)."[252] The walkability of the surrounding context determines if the site is pedestrian-oriented. In addition, utilizing existing research on walkability, such as the online interactive webpage, Walk Score, supported the analysis of how pedestrian-oriented the site is.

Similar to the physical environment, the qualities of the social environment were evaluated by mapping and analyzing the existing social environment, which includes if the site is considered a supporting neighborhood and the location of existing organizational ties. Concluding whether the site is supportive or not, was determined by

[252] Tresidder, "Using Gis to Measure Connectivity: An Exploration of Issues." 11

the density, crime rates, and the availability of drugs and alcohol. Crime rates are taken from data from the Honolulu Police Department (HPD), from their "computer aided dispatch system, and location shown are for the initial calls for service and may not be the location of the actual crime."[253] Crime data can only be retrieved from six months prior to the search date, therefore data listed in this research is from September 3, 2017 to March 2, 2018. Organizational ties was measured by the abundance and existence within a mile radius.

Together, these maps and analyses demonstrate how sites might be selected or eliminated in proposed locations for SLH on Oʻahu. This mapping and analysis technique can be applied universally, for any location to determine a healthy and successful physical and social environment for future development.

5.1 Waipahu

The Waipahu site is located in the center of Waipahu, right off of Farrington Highway. The Waipahu site consists of eight existing lots: 9-4-019:022, 9-4-019:021, 9-4-019:020, 9-4-019:019, 9-4-019:017, 9-4-019:016, 9-4-019:015, and 9-4-019:014, with a total lot area of 67,805 square feet.

Existing Health-Related Services

The existing surroundings of the Waipahu site that are health-related services include healthcare, social services, grocery stores, and parks.

The existing healthcare facilities that are within the mile radius include, Waipahu Family Health Center and Hina Mauka. Waipahu Family Health Center offers primary,

[253] "Hpd Information," http://honolulupd.org/information/index.php?page=crimemapping.

behavioral health, nutrition, and dental care, along with diagnostic and pharmacy services to only women and children. In addition to these services, Waipahu Family Health Center offers social services such as family planning and interpreter services.[254] Hina Mauka offers outpatient substance abuse treatment, typically for adolescents, but all ages are welcome.[255] The existing social service is the State of Hawaii Unemployment.

Currently, there are many grocery and food stores surrounding the site, such as Tammy's Polynesia Market, Time's Super Market, Da Fish Market, Waipahu Festival Market, Nii Market, and Jimmy's Produce and Seafood Market.

Waipahu District Park, Hans Lorange Neighborhood Park, and Ted Makalena Golf Course are accessible parks within the mile radius. These three public parks offer a range of activities, available to residents, during leisure time. Waipahu District Park offers indoor and outdoor activities and amenities. Indoor activities include a gymnasium with basketball and volley ball courts. Waipahu District Park accommodates outdoor tennis, basketball, baseball, football, and swimming. The amenities include "bleachers, accessible parking stalls, lights, pay phones, restrooms, and shade trees."[256] Hans Lorange Neighborhood Park only offers outdoor activities, such as baseball, basketball, and a playground. The amenities that are provided at this park include, "bleachers, bus

[254] "Wcchc - Location - Waipahu Family Health Center," http://www.wcchc.com/Contact/Waipahu-Family-Health-Center-Primary-Care.
[255] "Hina Mauka - Waipahu Outpatient Office," http://www.addicted.org/directory/item/hina-maukateen-care-kahuku-high-and-intermediate-school.html.
[256] "Department of C & C: Parks & Recreation: Waipahu District Park/Gym/Pool - Waipahu - - Honolulu County, Hawai'i," http://honolulucounty.hi.networkofcare.org/mh/services/agency.aspx?pid=DepartmentofCCParksRecreationWaipahuDistrictParkGymPool_899_2_0.

stop, drinking water, accessible parking stalls, lights, picnic tables, and shade trees."[257] Ted Makalena Golf Course is an eighteen-hole golf course, administered by the City and County of Honolulu, Department of Enterprise Services. The current fee for an eighteen-hole course ranges from seventeen dollars to sixty-six dollars on weekdays, and twenty-six dollars to sixty-six dollars on weekends and holidays, depending on personal possession of a golf identification card.[258]

Access to Transportation

The existing public transportation offered in Waipahu include twenty-six bus stop locations and bus lines: 432 East-West Waipahu, W1 Waipahu via Farrington, 433 Waipahu-Waikele Shopping Center, 434 Waipahu-Village Park, E Country Express! E, A City Express! A, 42 Ewa Beach-Waikiki, 40 Honolulu-Makaha, 99 Wahiawa-Mililani-Waipahu, and 43 Waipahu-Honolulu-Ala Moana.[259] Future development of the rail will increase the public transportation of Waipahu and will offer a faster route to Ala Moana, relatively forty-one minutes faster compared to the fastest bus route (40 Honolulu-Makaha).[260] The Waipahu Transit Center Station is planned to be adjacent from the site.

Currently, there are minimal bike facilities offered in the Waipahu neighborhood. Within the mile radius, there are only three current bike facilities. There is a bike route on Farrington Highway, a bike lane on Mokuola Street, and a bike path on Pearl Harbor

[257] "City & County of Honolulu - Department of Parks & Recreation - Park Information," http://gis.hicentral.com/fastmaps/parks/ParkDetails.aspx?id=182&lyrLst=1%7C0%7C0%7C0%7C1%7Clblsaerial2008.
[258] "Fees," https://www.honolulu.gov/des/golf/fees.html.
[259] "94-959 Awanei Street, Waipahu Hi - Walk Score," https://www.walkscore.com/score/94.dash.959-awanei-st-waipahu-hi-96797.
[260] Super User, "Route Map," (2018).

Bike Path.[261] The City Department of Transportation Services have plans to improve the bike network of Waipahu by incorporating "complete street features, including bike lanes" in the "upcoming street repaving effort for Waipahu Street, Mokuola Street/Managers Drive, as well as nearby Leoku and Leowahine Streets."[262]

The existing street connectivity of the Waipahu site is fair. There are twenty-three dangle nodes and fifty-five real nodes, meaning there are twenty-three dead ends and fifty-five intersections. The streets of the Waipahu site are 70% connected, with an average street connection of 463 feet.

Walk Score rates the Waipahu site a 65, meaning it is "somewhat walkable and some errands can be accomplished on foot."[263] Around thirty percent of the roads within the mile radius have sidewalks. According to the City and County of Honolulu, there has been a total of forty-four pedestrian crashes from 2006-2017.[264]

Zoning

The site is currently zoned as Apartment, low density (A-1), but TOD plans to rezone the land to Apartment Mixed Use, median density (AMX-2), once the rail is finished with construction. The floor area ratio (FAR) of AMX-2 is 1.9, and can be developed for commercial and apartment spaces. This will meet the live-work typology design guideline. Residents of this building could potentially work where they live.

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[261] "Oahu Bikeways Map," http://cchnl.maps.arcgis.com/apps/OnePane/basicviewer/index.html?appid=96d111b4f0c0400484dfcbd7f6c435ad.
[262] "Waipahu Town Action Plan," ed. City and County of Honolulu (2017).
[263] "94-959 Awanei Street, Waipahu Hi - Walk Score."
[264] "Story Map Journal," https://cchnl.maps.arcgis.com/apps/MapJournal/index.html?appid=bc7dd6fd9f2140348621a8ee1db41966.

Supporting Neighborhood

According to the City and County of Honolulu's 2010 Census Tracts, Waipahu has a population density per square mile of 6,001- over 12,000.[265] The Waipahu site is in neighborhood board 22 (Figure 4), and in 2010, the population was 61,879.[266]

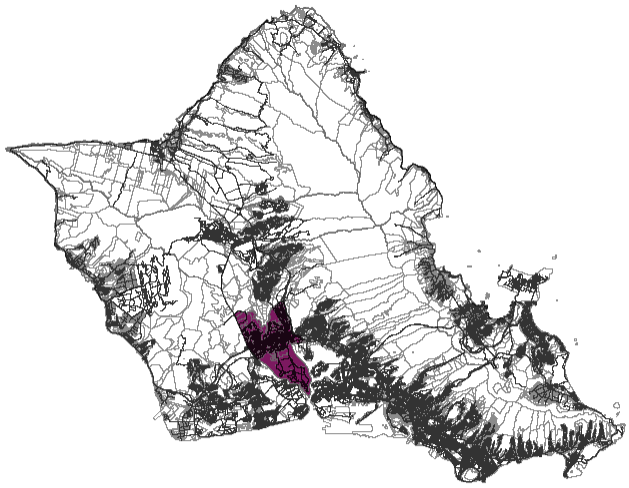

Figure 4: Waipahu Neighborhood Board
Source: Tax Parcel and Street data collected from DPP. Neighborhood Board data collected from CCHNL.[267] Graphic made by Author.

According to the Department of Business, Economic Development and Tourism's (DBEDT) Census data by Senate Districts, the Waipahu site is in Senate District 17, which includes Waipahu, Crestview, Manana, Pearl City, and Pacific Palisades. The population of Senate District 17 is "53,627."[268] There is "8.3% people below the poverty

[265] "City and County of Honolulu 2010 Census Tracts," ed. Office of Planning.
[266] "Resident Population for Oahu Neighborhoods: 2000 and 2010," (2016).
[267] "Neighborhood Boards," https://honolulu-cchnl.opendata.arcgis.com/datasets/f77ece67e30e46e7b38edac6d199aab5_5?uiTab=charts.
[268] "Hawaii 2011-2015 Acs 5-Year Estimates by Census Tracts & Legislative Districts," https://histategis.maps.arcgis.com/apps/MapSeries/index.html?appid=437e17f335774aceb4716283009e8496.

level."[269] The "median value of owner-occupied housing unit is $556,600 and the median rent is $1,304."[270] Between September 3, 2017 and March 1, 2018, there has been: eighteen crimes related to assault, sixteen burglary crimes, one case of disturbing the peace, ten driving under the influence crimes, three crimes related to drug and alcohol violations, five cases of fraud, nineteen crimes related to motor vehicle theft, three cases of robbery, two sex crimes, forty theft crimes, thirty-one vandalism crimes, thirty-four cases of vehicle break in, and three reported weapon-related crimes.[271]

5.2 King Street

The King Street site is located in Kakaʻako Community Development District (KCDD) Mauka Area. The site is made up of lots 2-1-044:039 and 2-1-044:040, totaling a combined lot area of 51,194 square feet. These two lots are currently being used as parking lots.

Existing Health-Related Services

The nearby health-related services include health care and parks. There are three health services nearby the King Street site. Straub Medical Center, Queen's Medical Center, and Kaiser Permanente Honolulu Medical Office are within the mile radius. Straub Medical Center "provides more than thirty-two different medical specialties, including orthopedics, cardiac care, neurology, cancer, endocrinology/diabetes, family medicine, gastroenterology, geriatric medicine, internal medicine, women's health, vascular and urology." Straub Medical Center also offers urgent-walk-in-care, Monday

[269] Ibid.
[270] Ibid.
[271] "Hpd Information."

through Friday 1:00 pm to 8:00 pm, and Saturdays and Sundays 8:00 am to 4:00pm.[272] Queen's Medical Center "is a 575-acute care facility accredited by the Joint Commission and is the major tertiary and quaternary referral center for cancer, cardiovascular disease, neuroscience, orthopedics, surgery, emergency medicine and behavioral health."[273] Although, Kaiser Permanente Honolulu Medical Office does not offer emergency services and urgent services, this Kaiser location does offer pharmacy, behavioral health, nutrition, prevention and health education, allergy, and audiology services.[274]

Currently, there are only minimarts within the mile radius. The nearby minimarts are Plaza Minimart and Imperial Minimart. There are two farmers markets that are within the mile radius, Honolulu Farmers Market and Kaiser Farmers Market. The Honolulu Farmers Market happens in the front lawn of Neil S. Blaisedell Center on Wednesday nights. The Kaiser Farmers Market opens Thursday mornings at the Kaiser Honolulu Clinic.

There are four parks inside the mile radius, Thomas Square Park, Kawaiahao Mini Park, Mother Waldron Neighborhood Park, and Dole Community Park. Thomas Square Park is the closest park to the King Street site. Thomas Square Park is currently undergoing renovations and is planned to be completed by summer 2018. The renovations will include a new irrigation system, new grass, removal of unhealthy trees, a

[272] "Straub - Locations - Straub Medical Center - Hawaii Pacific Health," https://www.hawaiipacifichealth.org/straub/locations/straub-medical-center/.
[273] "About the Medical Center," http://queensmedicalcenter.org/about-us-home.
[274] "Kaiser Permanente Honolulu Medical Office - Services and Locations - Kaiser Permanente," https://healthy.kaiserpermanente.org/health/care/!ut/p/a0/FcdNCoAgEAbQs3SA-Awkol2nKN0NY9mAf4QU3r56uweLDTbRLZ6q5EThuzmIJUhts2uJojBWWFhxMINSWo__ykU-EkzKPROfO0qM07N03QvWkHZm/.

statue of King Kamehameha III, a flag pole with the Hawaiian flag, and walkways.[275] Prior, to the renovations Thomas Square Park was mostly being utilized by Honolulu's homeless population, protestors, and occasional plant sales. Mother Waldron Neighborhood Park recently reopened February 2018, after being scheduled to close for a month for maintenance and renovation. Mother Waldron Park has outdoor basketball courts and playground.

Access to Transportation

The existing public transportation within the King Street site consists of thirty-two bus stop locations offering a range of bus lines: 2 Waikiki-School-Middle, 11 Makalapa-Halawa-Aiea Heights, 15 Makiki-Pacific Heights, 43 Waipahu-Honolulu-Ala Moana, 52 Honolulu-Mililani-Wahiawa, 54 Honolulu-Pearl City, 62 Honolulu-Wahiawa, 87 Windward Express-Kailua, 88A North Shore Express, and 85 Windward Express-Kaneohe.[276] Future development of the rail will provide better public transportation within the King Street site, providing two rail stations: Civic Center Station and Kakaako Station.

Lanes, paths, routes, and separated bike lanes within the surrounding context establish an accommodating alternative to transportation. In addition to the acceptable amount of bike facilities, there are fourteen Biki bikeshare stations accessible within the mile radius of the King Street site.[277] The City and County also has proposals for future bike facility development, with the addition of bike lanes on South Hotel Street, Victoria

[275] @khonnews, "Part of Thomas Square to Reopen Following Million-Dollar Maintenance Project," (2017).
[276] "777 South King Street, Honolulu Hi - Walk Score," https://www.walkscore.com/score/777-s-king-st-honolulu-hi-96813.
[277] "Map of Biki Stops - Biki," https://gobiki.org/map-of-biki-stops/.

Street along Thomas Square Park, Cooke Street, Punchbowl Street, and Beretania Street, bike paths through Thomas Square Park, in between Neal S. Blaisedell and McKliney High School, and along Kapiolani Boulevard, and bike routes on Ward Avenue, Queen Street, and Pensacola Street.[278]

The existing street connectivity of the King Street site is acceptable. There are only eight dangle nodes and seventy-six real nodes, meaning there are only eight dead ends. The streets of the King Street site are 90% connected, with an average street connection of 430 feet.

Walk Score rates the King Street site a 92.[279] As a result of being a very walkable location, there are clearly many pedestrians, which results in a higher amount of accidents. There has been ninety pedestrian crashes from 2006-2017, within the mile radius of the King Street site.[280] About 60% of the streets have sidewalks.

Zoning

The existing zoning of the King Street site is regulated by the Hawaii Community Development Authority (HCDA) and is in the Mauka Kakaako Community Development District (KCDD). The HCDA zoning regulations supersede the Land Use Ordinance (LUO) regulations. There is a 400-foot height limit and a FAR of 3.5, but both numbers are negotiable depending on the proposed development.[281] This zoning allows a live-work typology, with potential commercial and housing units.

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[278] "Oahu Bikeways Map."
[279] "777 South King Street, Honolulu Hi - Walk Score."
[280] maps_of_oahu maps of oahu, map oahu, mapsoahu, mapsofoahu, maps honolulu, oahu maps, ""Maps of Oahu" -Honolulu Gis," http://honolulugis.org/.
[281] "Hawai'i Community Development Authority | Plans/Rules," http://dbedt.hawaii.gov/hcda/plans-rules/.

Supporting Neighborhood

The population density per square mile around the King Street site is between 6,001- over 12,000.[282] The King Street site is within neighborhood 11 (Figure 5), with 19,014 residents in 2011.[283]

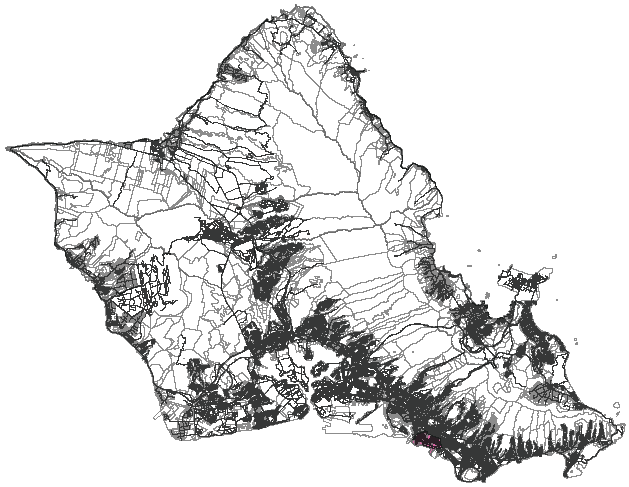

Figure 5: King Street Neighborhood Board
Source: Tax Parcel and Street data collected from DPP. Neighborhood data collected from CCHNL. Graphic made by Author.

According to the DBEDT Census data by Senate Districts, the King Street site in Senate District 12, which includes Waikiki, Ala Moana, Kakaʻako, McCully, and Moʻiliʻili. The population of Senate District 12 is "54,716."[284] There is "12.7% people below the poverty level."[285] The "median value of owner-occupied housing unit is $426,100 and the median rent is $1,282."[286] Between September 3, 2017 to March 1, 2018 there has been one case of arson, twenty-nine assault cases, thirty-four reported cases of burglary,

[282] "City and County of Honolulu 2010 Census Tracts."
[283] "Resident Population for Oahu Neighborhoods: 2000 and 2010."
[284] "Hawaii 2011-2015 Acs 5-Year Estimates by Census Tracts & Legislative Districts."
[285] Ibid.
[286] Ibid.

ten disturbing the peace reports, sixty cases of drug and alcohol violations, thirty-four driving under the influence reports, forty-seven cases of fraud, thirty-nine cases of motor vehicle theft, nine reported cases of robbery, eighteen reported sex crimes, 185 cases of theft, fifty-five reports of vandalism, seventy cases of vehicle break ins, and seven reports of weapons.

5.3 Kaneohe

The Kaneohe site is lot 4-5-023:001 with a total lot area of 174,240 square feet. Currently, this is an empty lot that can potentially be proposed for future housing development.

Existing Health-Related Services

The existing health-related services within the Kaneohe site include health and social services and parks. All health services within the Kaneohe site offer care relating toward mental health. Windward Oahu Mental Health, Hawaii State Hospital (HSH), and Hina Mauka are located within the mile radius of the site. Windward Oahu Mental Health "provides psychiatric evaluation, crisis intervention, and psychosocial rehabilitation."[287] HSH is a "state psychiatric hospital" that "provides adult inpatient psychiatric services" for 202 patients.[288] Hina Mauka offers residential treatment for individuals with substance abuse disorders and "behavioral health issues."[289]

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[287] "Department of Health: Oahu Community Mental Health Windward: Oahu Treatment Services Section - Kaneohe - - Honolulu County, Hawai'i," http://honolulucounty.hi.networkofcare.org/mh/services/agency.aspx?pid=DepartmentofHealthOahuCommunityMentalHealthWindwardOahuTreatmentServicesSection_899_2_0.
[288] "Adult Mental Health Division | About," http://health.hawaii.gov/amhd/hawaii-state-hospital-about-us/.
[289] "Forms - Hina Mauka," http://www.hinamauka.org/adult-programs/forms/.

There are two nearby parks: Kaneohe District Park and Kapunahala Neighborhood Park. Although, there are no grocery stores within the mile radius, there is a People's Open Market on Thursday mornings at Kaneohe District Park. Kaneohe District Park also has a range of recreational facilities, including indoor and outdoor activities. The indoor facility consists of a gymnasium, basketball courts, classrooms, boxing room, racquetball room, kitchen, lounge, multipurpose room, weight room, and showers. Outdoor facilities include a swimming pool, tennis, volleyball, badminton, and basketball courts, soccer, football, and softball fields, and a skate park.[290] Kapunahala Neighborhood Park offers outdoor activities, such as baseball, volleyball, and a children's playground.

Access to Transportation

The Kaneohe site has thirteen bus stop location allowing access to seven bus routes: PH4 Kaneohe-Kahaluu-Pearl Harbor, 56 Honolulu-Kailua-Kaneohe, 77 Waimanalo-Kaneohe, 85 Windward Express-Kaneohe, 85A Windward Express-Haiku, 88 Kahaluu-Ahuimanu Express, and 88A North Shore Express.[291]

The existing bike facilities within the surrounding context of the Kaneohe site is discouraging with a total of two bike lanes and one bike route. The two bike lanes are on a portion of Kahekili Highway and on Keaahala Road. The bike route is on Haiku Road. The City and County of Honolulu proposed to add bike routes on Kahuipa Street,

[290] "Center Detail," http://parks.honolulu.gov/cD.sdi?center_id=146.
[291] "45-619 Keaahala Road, Kaneohe Hi - Walk Score," https://www.walkscore.com/score/loc/lat=21.41029190595708/lng=-157.80770301818848.

Keaahala Road, Keneke Street, and Likelike Highway, bike paths on Keneke Street, and bike lanes on Kamehameha Highway.[292]

The existing street connectivity of the Kaneohe site is unacceptable, which correlates to the site's walkability, furthermore affecting human health. If streets are not connected, with many dead ends or cul-de-sacs, there are no direct paths, which means people cannot choose an alternative route or mode of transportation, such as walking to their destinations, resulting in the need to drive, which also affects the air quality, ultimately, creating a poor physical environment. There are thirty-two dangle nodes and thirty-three real nodes. The streets of the Kaneohe site are 50% connected, with an average street connection of 425 feet.

There have been only four pedestrian crashes, from 2006-2017, because the Kaneohe site is not walkable, due to the streets not being well connected.[293] Walkscore rates this site a 35, meaning it is a "car-dependent location."[294] Within the mile radius of the Kaneohe site, approximately 30% of the roads have sidewalks.

Zoning

Currently, the Kaneohe site is zoned as Residential, 5,000 square feet (R-5). The FAR for R-5 zoning is 50% of the lot area, allowing 87,120 square feet of buildable floor area. The height limit is twenty-five feet. The current zoning of the Kaneohe site does not allow a work-live building typology, and would require a zoning change.

[292] Ibid.
[293] maps of oahu, ""Maps of Oahu" -Honolulu Gis."
[294] "45-619 Keaahala Road, Kaneohe Hi - Walk Score."

Supporting Neighborhood

The 2010 Census Tracts shows Kaneohe's population density per square mile is 401 - 2,500.[295] Kaneohe is in Neighborhood 30 (Figure 6), and in 2010 there was a total of 33,788 residents.[296]

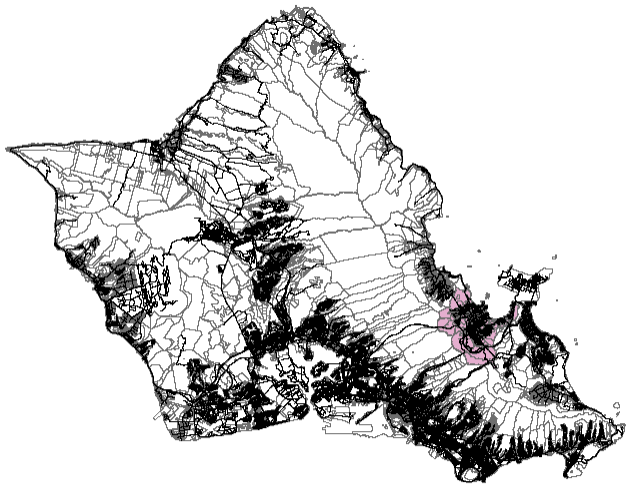

Figure 6: Kaneohe Neighborhood Board
Source: Tax Parcel and Street data from DPP. Neighborhood data from CCHNL. Graphic made by Author.

According to the DBEDT Census data by Senate Districts, the Kaneohe site is in Senate District 24, which includes Kaneohe, Kaneohe Marine Corps Air Base (MCAB), Kailua, He'ia, and 'Ahuimanu. The population of Senate District 24 is "62,488."[297] There is "6.1% people below the poverty level."[298] The "median value of owner-occupied housing unit is $675,600 and the median rent is $2,218."[299] From September 3, 2017 to

[295] "City and County of Honolulu 2010 Census Tracts."
[296] "Resident Population for Oahu Neighborhoods: 2000 and 2010."
[297] "Hawaii 2011-2015 Acs 5-Year Estimates by Census Tracts & Legislative Districts."
[298] Ibid.
[299] Ibid.

March 1, 2018 there have been fourteen reported crimes of assault, five cases of burglary, two reported cases of disturbing the peace, three reported cases of drug and alcohol violations, four driving under the influence cases, four cases of fraud, seven motor vehicle theft crimes, four reported sex crimes, fourteen reported crimes of theft, eight vandalism reports, twelve reported crimes of vehicle break in, and one reported case of weapons.

5.4 Conclusion

Based on the above analysis of such factors of the physical and social environments, the King Street site is selected. In comparison to the Waipahu and Kaneohe sites, the King Street site has the most positive physical and social environments for SLH. The three existing healthcare (Straub Medical Center, Queen's Medical Center, and Kaiser Permanente Honolulu Medical Office) within the mile radius are only a ten to fifteen minute walk, refer to Figure 7. King Street is also the most accessible location to all modes of transportation: various bus routes, future nearby TOD rail stations (Figure 10), bike facilities (Figure 11), bike share stations, and streets are well connected (Figure 12) resulting in a walkable and pedestrian-oriented site (Figure 13). The existing zoning in the HCDA- Kakaʻako Mauka District allows a mixed-use high rise to exist. The 3.5 FAR (floor area ratio) allows the highest buildable square footage compared to the zoning regulations of the other two sites, resulting in more housing. The population density with areas above 30,000 people per square kilometer (Figure 15) allows a diverse social environment for various social networks and communities to exist.[300]

[300] UOdocent, "Honolulu Population Density," http://www.arcgis.com/home/item.html?id=6119c8e7760a490fa28a9e41780edcae.

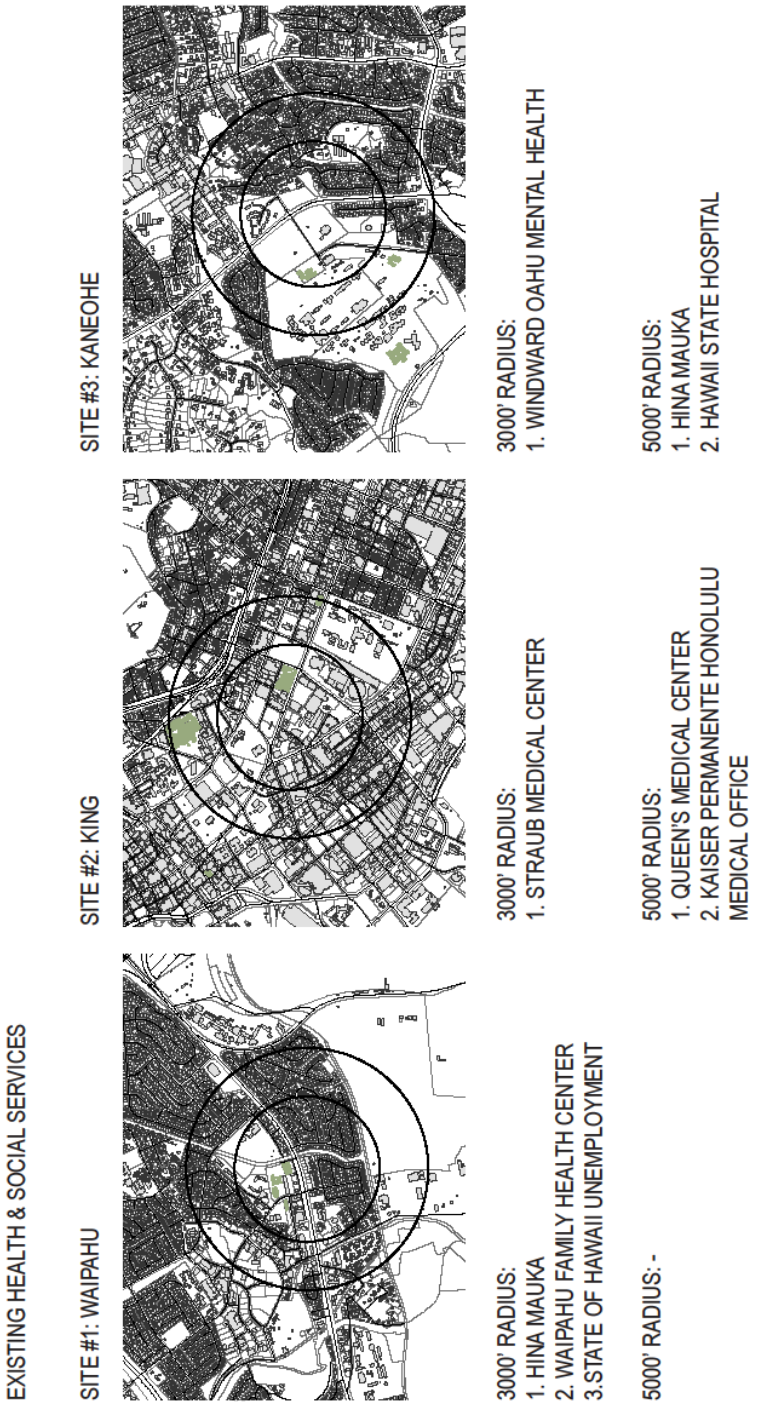

Figure 7: Existing Health Services
Source: Data collected from Department of Planning and Permitting (DPP).[301] Graphic made by author.

[301] Honolulu Land Information System (HoLIS) Dept of Planning and Permitting and Department of and Permitting Honolulu Land Information System (Holis), City and County of Honolulu, "Sde.Cch.Hospital_Clinic," Department of Planning and Permitting, Honolulu Land Information System (HoLIS), http://gis.hicentral.com/pubwebsite/metadata/Hospital_clinic.html.

Figure 8: Existing Grocery Stores and Markets
Source: Data collected from DPP and Author. Graphic made by author.

Figure 9: Existing Parks
Source: Data collected from DPP. Graphic made by Author.

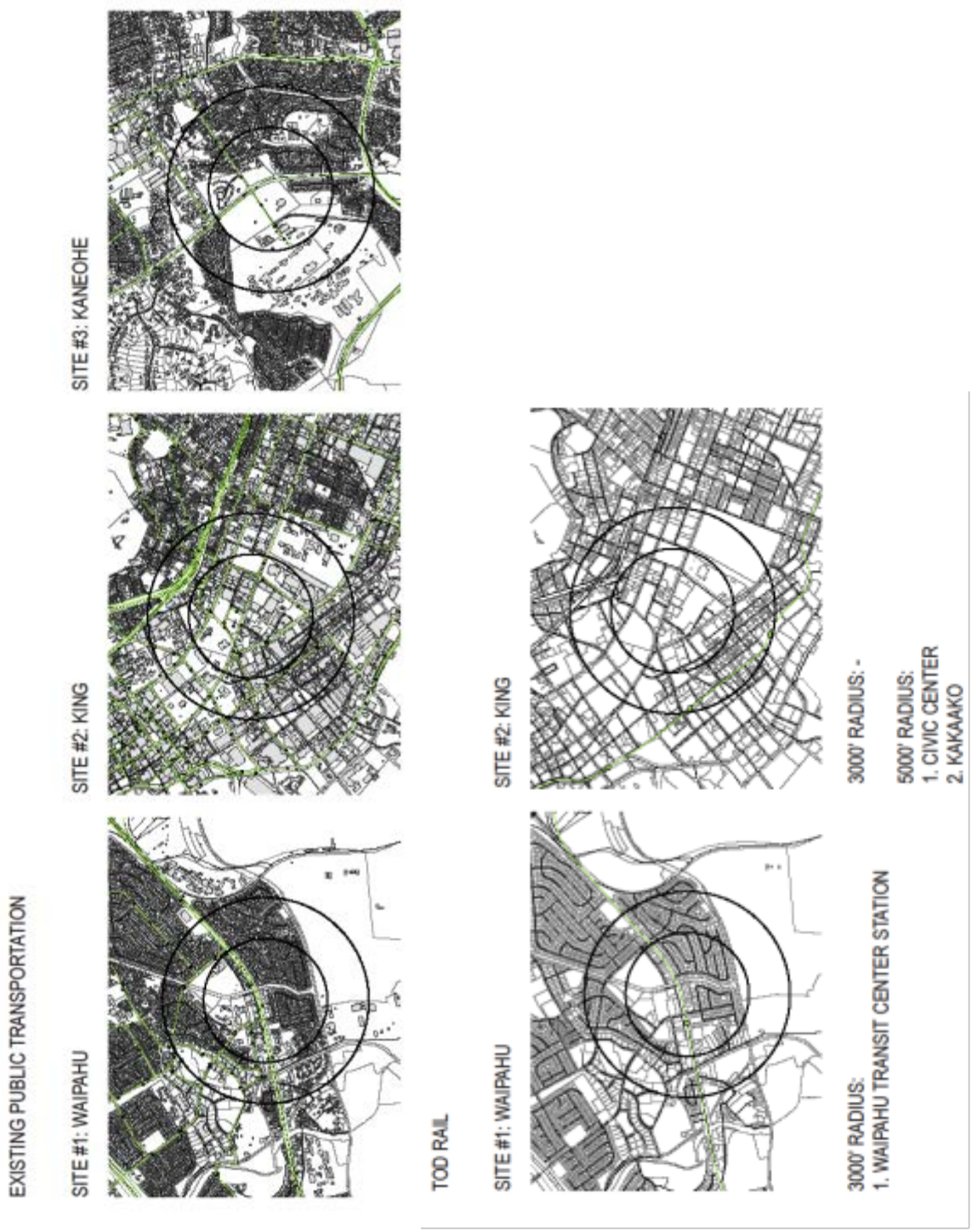

Figure 10: Existing Public Transportation and Proposed TOD
Source: Data collected from DPP and City and County of Honolulu (CCHNL). [302] Graphic made by Author.

[302] "Search for Transportation | Honolulu Open Geospatial Data," https://honolulu-cchnl.opendata.arcgis.com/datasets?q=Transportation&sort_by=relevance.

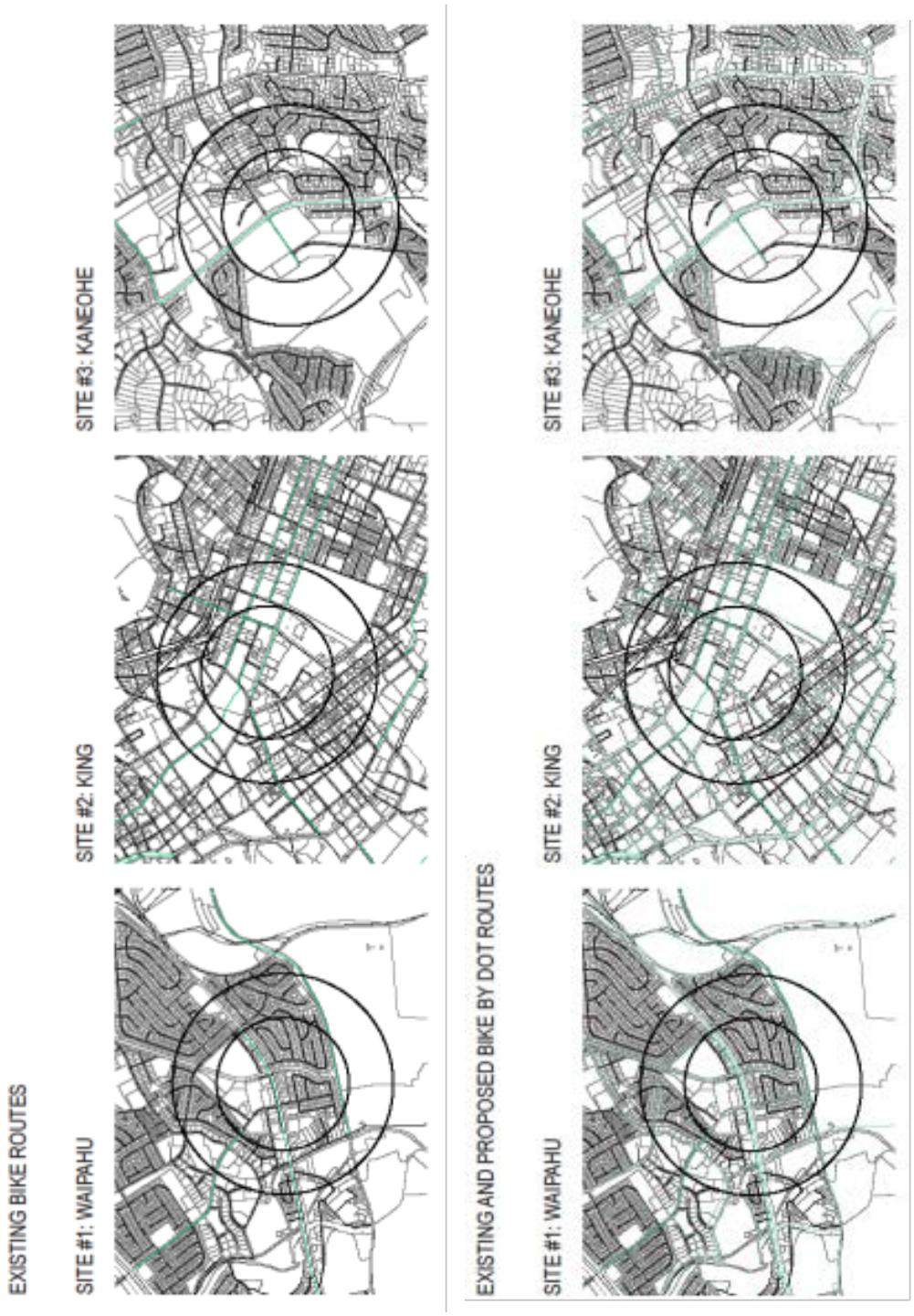

Figure 11: Existing and Proposed Bike Facilities
Source: Street and Tax Parcel data collected from the DPP. Existing and Proposed Bike Facilities data collected from CCHNL. Graphic made by author.

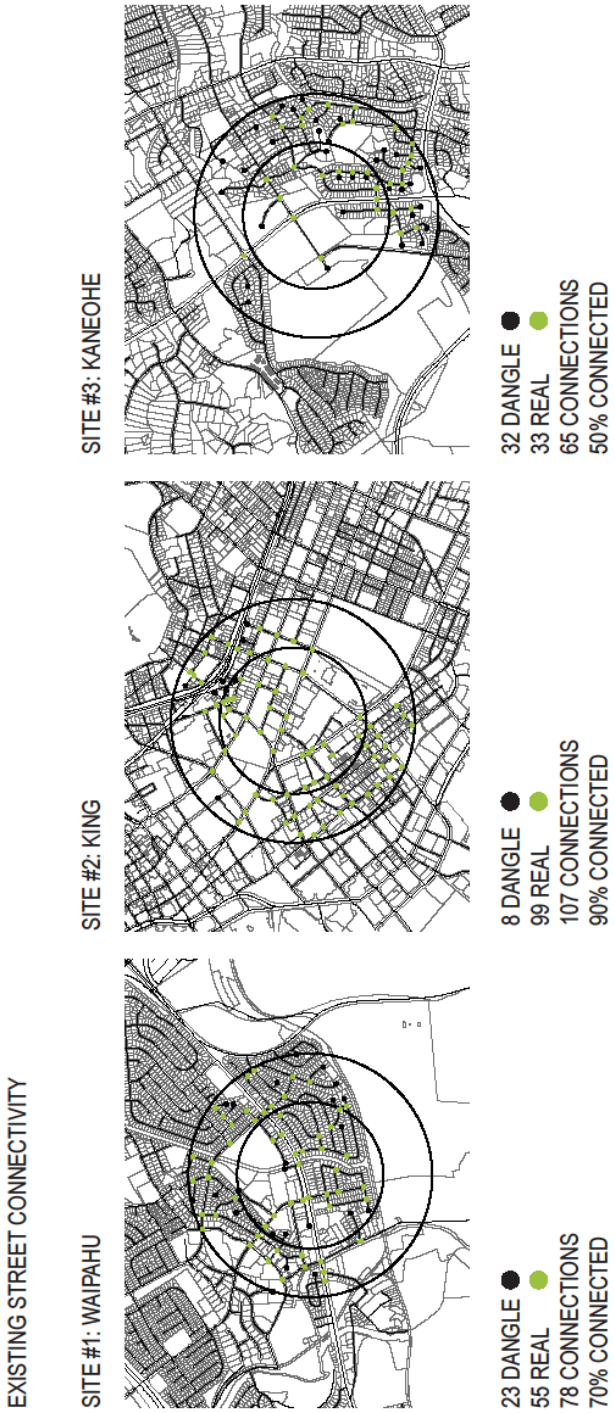

Figure 12: Existing Street Connectivity
Source: Street and Tax Parcel Data collected from DPP. Node and Connection Data collected by Author. Graphic by Author.

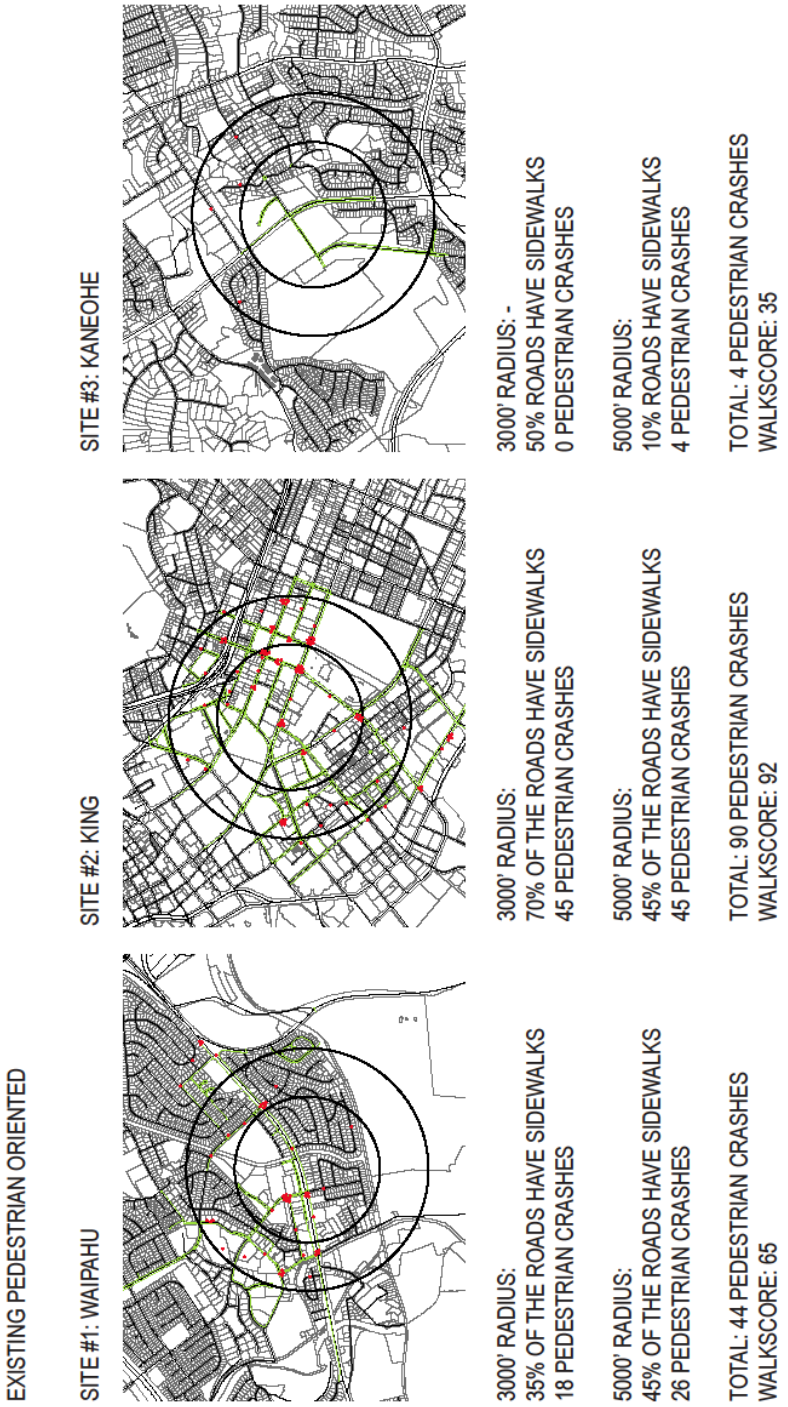

Figure 13: Existing Walkability
Source: Streets, tax parcels, and pedestrian crashes data collected from DPP. WalkScore rating from walkscore.com. Sidewalk coverage data collected by Author. Graphic made by author.

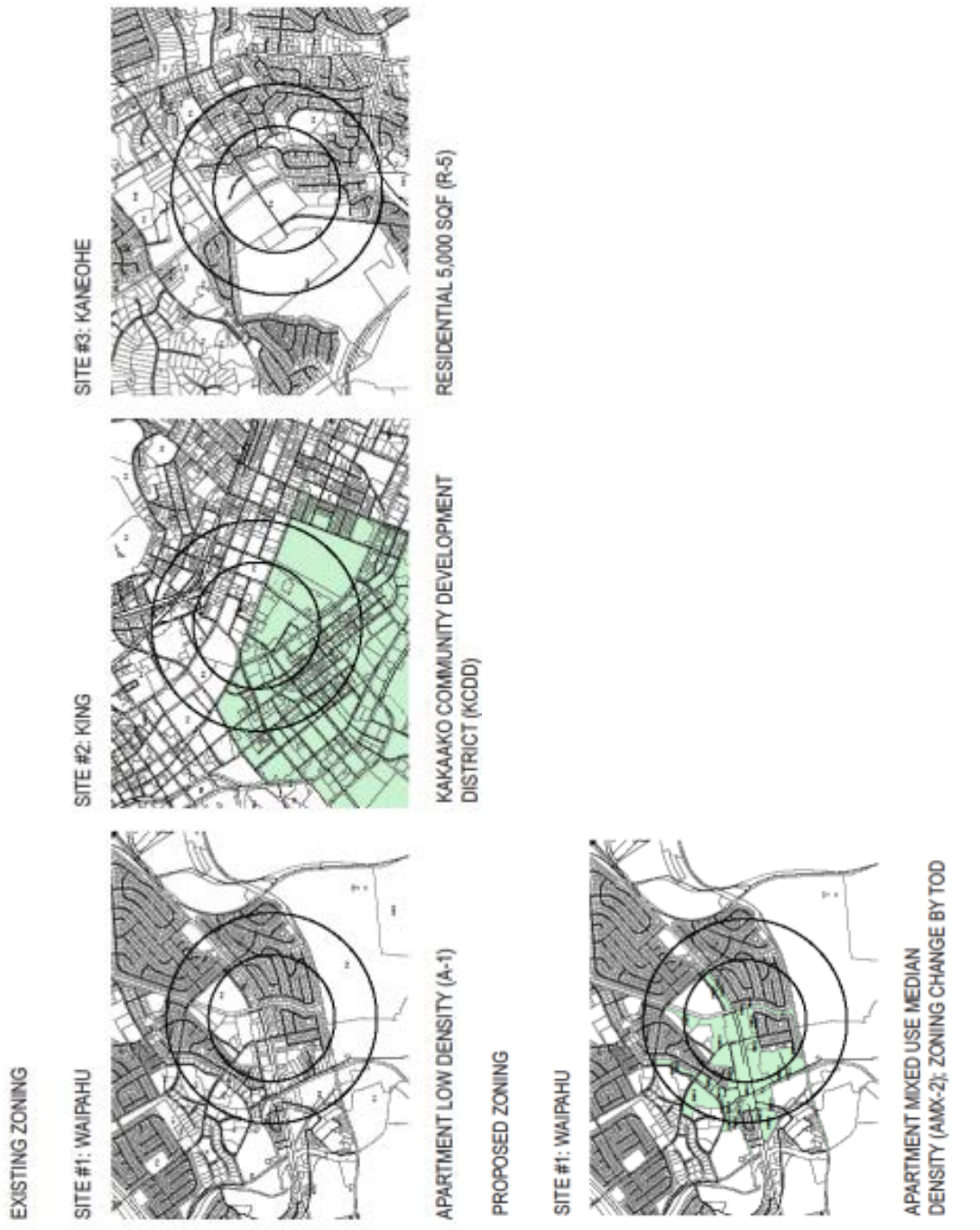

Figure 14: Existing and Proposed Zoning
Source: Street, Tax Parcel, and Zoning Data collected from DPP. Proposed Zoning Data collected from CCHNL. Graphic by Author.

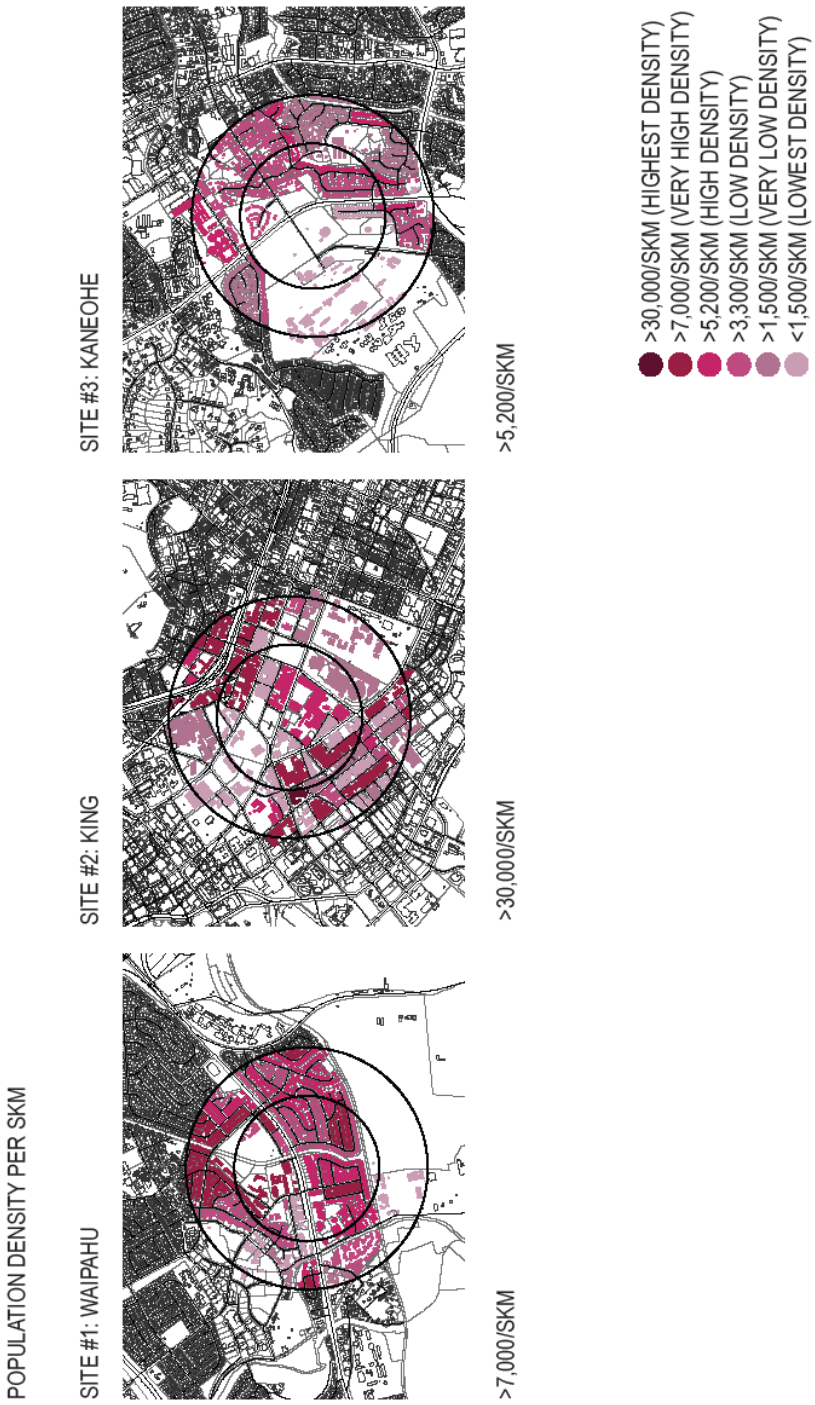

Figure 15: Population Density
Source: Streets, Tax Parcels, and Building Data from DPP. Population Density data from UODocent.[303] Graphic made by Author.

[303] UOdocent, "Honolulu Population Density."

Figure 16: Existing Churches
Source: Street, Building, and Tax Parcel Data collected from DPP. Church locations collected by Author. Graphic made by Author.

Figure 17: Existing Community Centers
Source: Street, Building, and Tax Parcel Data collected from DPP. Community Center locations collected by Author. Graphic by Author.

Chapter 6: Hoʻāliʻi

Hoʻāliʻi is the proposed development for the King Street site. In the 1830s, the Hawaiians would refer to King Street as "Alanuiʻāliʻi," which is literally translated to "Street King." [304] Hoʻāliʻi or "to make a king" is an abstract derivative from this historic Hawaiian reference of King Street that presents a narrative of rehabilitation and regrowth, ultimately referring to the recovering individuals.

Kaka ʻako is very attractive to developers, therefore Hoʻāliʻi is a mixed-use and mixed-income development that offers commercial spaces on the street level, affordable, reserved, and market housing units above. Commercial spaces allow the surrounding community to interact with residents of Hoʻāliʻi. Unfortunately, affordable, low-income, and especially SLH are unattractive to prospective communities and neighborhoods, this concept is called "not in my back yard (NIMBY). Leonard's and Ferrari's study concluded that SLH residents are actually good neighbors, and this misconception of SLH residents is due to ignorance.[305] Friedner D. Wittman suggests, "the best way to deal with NIMBYism seems to be simply to move in."[306] Therefore, following the Oxford Houses' concept of locating recovering individuals in good neighborhoods and Wittman's NIMBY solution of just moving in, the affordable units will be available to be rented out by recovering individuals.

[304] T. Blake. Clark, "Honolulu Streets," (The Printshop, 1939).
[305] L. A. Jason and J. R. Ferrari, "Oxford House Recovery Homes: Characteristics and Effectiveness," *Psychol Serv* 7, no. 2 (2010).
[306] Wittman, "Affordable Housing for People with Alcohol and Other Drug Problems."

6.1 Hoʻāliʻi Program

To maximize the 3.5 FAR (floor area ratio) and the 400 foot-height limit, a mixed-use and mixed-income development is being proposed. The mixed-use development will include commercial and housing units. The total lot area is 51,914 square feet, allowing 181,699 buildable square feet. This buildable square footage is negotiable because this development proposes twenty percent of the housing units for reserved housing. This complies with HCDA, Section 8 Reserved Housing, and will give incentives to developers, which varies on the situation, but can include "non-monetary offsets in the form of density or height bonuses, modifications to rules, and expedited permits."[307] This project will use the density bonus of an additional 2.0 FAR, to provide more square footage for housing. With the density incentive, the total buildable square footage for commercial and housing units, is now 285,527 square feet. 50,400 square feet is for commercial spaces, which leaves 235,127 square feet for the parking and residential spaces. 50,400 square is dedicated to parking, but according to the HCDA regulations, parking square footage "does not count toward permitted FAR," which leaves 235,127 square feet for the residential spaces.[308]

The building typology is made up of a podium base with a tower element above (Figure 18). The podium base consists of two floors of commercial spaces (50,400 square feet) and two floors of parking spaces (50,400 square feet of non-floor area), which occupies levels one through four on a 25,200 square foot floor plate (180' by 140'), with the longer side spanning from mauka-makai.[309] The tower element placed on

[307] "Hawai'i Community Development Authority | Plans/Rules."
[308] "8 Parking & Transportation Demand Management," ed. Transportation Demand Management (2013).
[309] Mauka-makai is a HCDA regulation, referring to the building orientation with the longer side spanning from the mountains to the ocean, to maintain corridor views.

top of the podium is a 9,600 square foot floor plate (80’ by 120’), allocated for the residential spaces, see Figure 18.

Figure 18: Hoʻāliʻi Site Plan

In order to maximize the 400 foot height limit, the residential floor spaces cannot use the total 9,600 square foot floor plate, because that would only allow 24 residential floors, with a total 280 foot height. Therefore, residential floors range in floor plate square footage, from 5,300-9,600 square feet, to create the 340 foot tall building (see Figure 19), and a total square footage of 235,280 square feet.

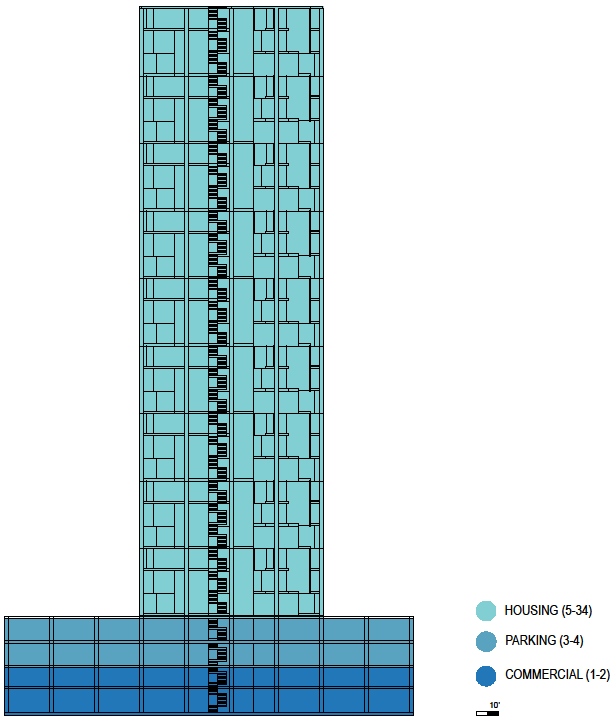

Figure 19: Hoʻāliʻi Building Program on the West Elevation

The 153 square feet that is over the 235,127 allowable buildable area is negotiable and HCDA would most likely allow the additional 153 square feet to be built, because of the range of housing that Hoʻāliʻi provides. Affordable, reserved, and market units are available to purchase or to rent at Hoʻāliʻi. There is a total of 120 housing units, 50 units are affordable, 40 units are reserved, and the remaining 30 units are market price. HCDA only asks for 20% reserved housing in order to receive incentives, but Hoʻāliʻi provides 33% reserved housing, with the addition of 42% affordable housing. Therefore, the addition 153 feet over the 235,127 allowable square footage is miniscule and easily amenable.

6.2 Collective Housing Precedents

The design guidelines expressed the importance of creating an immediate environment that increases social interaction. To increase social interaction and to understand the design characteristics of social-enticing spaces, collective housing is used as a precedent. Kitchens, laundry rooms, gardens, hobby spaces, informal and formal meeting spaces are communal areas that can potentially encourage social interaction. Narkomfin Dom-Kommuna, 8 House, and the Collective Stratford display design strategies for collective living.

Narkomfin Dom-Kommuna

Narkomfin Dom-Kommuna is located in Moscow, Russia, built in 1928, and designed by Moisei Ginzburg, initially "to house Ministry of Finance employees."[310] The development of the Narkomfin was during "the Constructivist Movement, as a post-revolutionary experiment," named the "Social Condenser," with the intentions to evolve traditional family-living.[311] The solution was to adopt collective housing strategies, and maximize shared services, such as "bathrooms and kitchens," while minimizing individual-private spaces.[312] The Narkomfin is a seven story building, comprised of eight "K" units, thirty-two "F" units, four D units, one penthouse, and an Annex building for the shared (collective) services.

[310] Aurora Fernandez. Per, Javier. Mozas, and Alex S. Ollero, "10 Stories of Collective Housing," (Vitoria-Gasteiz, Spain: a+t architecture publishers, 2013).
[311] Ibid., 73.
[312] Ibid.

The entrance to the housing units are on a separate floor from the sleeping spaces, which creates a sense of privacy. "K" units are accessible from the first floor and "F" units are accessible from the fourth floor. "K" units were designed for "large or multi-generational families," with a "five meters high" living area, kitchen, bathroom, and two bedrooms.[313] "F" units are smaller and were ideally for two people, with a living room, toilet, and a wash bin.[314] The four "D" units are located on the sixth floor, which were designed for "single people."[315] Adjacent to the "D" units, is the entrance to the two-story Miliutin penthouse, "initially planned as a recreational area for the community," but redesigned by Nikolai Alexandrovich Miliutin once the Narkomfin was no longer needed for the Ministry of Finance employees, and instead occupied by the Nomenklatura.[316] Also, on the sixth floor is a communal roof-top terrace.

The Annex building is a separate building that joins the housing units with a bridge on the first floor. The Annex building includes collective spaces such as: "sports area, dressing rooms, storage, public balcony, dining area, communal kitchen, and reading room."[317] The Annex building was not as successful as Moisei Ginzburg intended. In Ginzburg's defense, a new Socialist order was conceived, and kitchens were no longer considered a collective activity. As a result, kitchens were retrofitted into the "F" units.

Although, the collective design of the Narkomfin was not successful, the individual-private life was. Moisei Ginzburg resolved the issue of how to maintain

[313] Ibid., 87-88.
[314] Ibid., 93.
[315] Ibid., 94.
[316] Ibid., 68.
[317] Ibid., 85.

privacy within a collective dwelling. The combination of restricting access to dwelling units to only floors one and four and integrating multi-level housing units, developed privacy for the residents.

8 House

8 House is a 62,000 square meter-mixed use development, located in Copenhagen, Denmark, designed by Bjarke Ingels Group (BIG), completed in 2010.[318] 8 House has received two awards for "Best Housing" from the 2012 AIA National Award and the 2011 World Architecture Festival.[319]

BIG attempted to resolve the failures of the Robin Hood Gardens by applying design elements, specifically the elevated pedestrian street and the central courtyard. Bjarke Ingels believes the Smithson's elevated pedestrian street did not succeed because "the connection to the ground was covered over."[320] "a+t" research group identifies that Robin Hood Gardens actually borrowed design elements from the Justus Van Effen Complex by Michiel Brinkman, a four-story collective housing complex built in 1922, located in Rotterdam, The Netherlands.[321] The Justus Van Effen Complex is famous for "the street in the air, which gave all dwellings direct access from outside."[322] The elevated street connected 264 housing units, spanning over two blocks. The elevated street resembled a street in a suburban neighborhood, where children would enjoy and play.[323]

[318] "Big | Bjarke Ingels Group," https://www.big.dk/#projects-8.
[319] "Big | Bjarke Ingels Group," http://big.dk/press/8_66.
[320] @dezeen, "Big's 8 House Succeeded Where Smithson's Streets Failed, Says Bjarke Ingels," (2016).
[321] Per, Mozas, and Ollero, "10 Stories of Collective Housing." 12.
[322] Ibid. 25.
[323] Ibid. 50.

8 House offers residences, “shops, offices, and a kindergarten,” within the eight-shaped structure.[324] These spaces are connected by a 30 foot-wide pedestrian passage. BIG’s pedestrian passage differs from previous models, by maximizing natural daylight, understanding user functions, and integrating picturesque views for housing units.[325] These conditions constructed a unique sloping pedestrian path, allowing pedestrian access from the ground floor to the tenth floor. The eight shape allows housing units to receive natural ventilation and daylight, while “commercial spaces merge with life on the street.”[326] There are 475 housing units with three different types: row houses, apartments, and penthouses.[327] Similar, to the Justus Van Effen Complex, 8 House presents each housing unit with a front yard.[328]

BIG designed 8 House to increase social interaction among the residents and users of the mixed-use development by incorporating the pedestrian passage and residential front yards. BIG studied and reiterated similar past design strategies to achieve the ultimate goal of increased social interaction.

The Collective Stratford

The Collective Stratford is a proposed 18,800 square meter “co-living” building, located in London, United Kingdom, with the current status of “resolution to grant consent.”[329] PLP Architecture is a London-based firm “that partnered up with the Collective to conceive a new model of housing.”[330] Together, this collaboration reacted

[324] @dezeen, "Big's 8 House Succeeded Where Smithson's Streets Failed, Says Bjarke Ingels."
[325] "8h - the 8-House," (@vimeo, 2018).
[326] "Big | Bjarke Ingels Group."
[327] Ibid.
[328] "8h - the 8-House."
[329] "The Collective Stratford - Plp Architecture," http://www.plparchitecture.com/the-collective-stratford.html.
[330] Ibid.

to London's current housing market, where "a significant proportion of Londoners can no longer afford to rent or buy" housing.[331] This new approach of living, uses a mixed-use development incorporating "a unique housing concept offering low cost rent, a serviced apartment hotel, as well as an incubator space, a public viewing gallery, restaurant, retail, and amenity spaces for the public and residents."[332] The main focus of the Collective Stratford is the social and communal spaces, which are "strategically located to allow tenants to spontaneously encounter each other and socialize."[333]

PLP Architecture has created "a new mixed use community" by reorganizing the conventional mixed use high rise design. Typically, mixed use high rises have commercial on the base and housing units stacked above. PLP Architecture integrates communal, amenity, and commercial spaces throughout the thirty story building.

The thirty story building, which is made up of two structures (a ten story structure, and a thirty story structure), offers 223 co-living units and 214 serviced apartment units.[334] The ground floor is a double height foyer, lobby, and space for gathering, exhibitions, and events.[335] The mezzanine floor is identified as the incubator, which is dedicated to "flexible shared working space as well as space for exhibitions and events."[336] The serviced apartments begin on first floor up to the tenth floor. A typical serviced apartment floor will be an arrangement of twenty rooms, consisting of two "Premium One Bed" rooms, two "Deluxe One Bed" rooms, ten "One Bed" rooms, seven "Two Bed" rooms, and one "Three Bed" room. On floors one and six, a guest lounge

[331] Ibid.
[332] PLP Architecture, "The Collective Stratford Design and Access Statement," (2015).
[333] "The Collective Stratford - Plp Architecture."
[334] Architecture, "The Collective Stratford Design and Access Statement."
[335] Ibid.
[336] Ibid.

will be present instead of three rooms. The split in structures can be seen starting on the eleventh floor. The "co-living" units are on "levels eleven through twenty-one and twenty-three through thirty."[337] Communal kitchens are provided on every "co-living" floor. Larger amenity spaces for "co-living" residents are offered on floors eleven, twenty-one, and twenty-eight. Typical "co-living" units are 12 square meters that fits "a bedroom, desk, wardrobe, kitchenette, and bathroom pod."[338] The restaurant is located on twenty-second floor.

PLP Architecture's design strategy of infusing and displacing commercial, communal, hotel, and affordable spaces was their approach of creating social interaction. As a result of the Collective Stratford still being in the permitting process, it is hard to determine if these design strategies will be successful.

All three housing projects demonstrate design strategies that can be applied to Hoʻāliʻi's design, to increase a social community while providing privacy. Narkomfin Dom-Komunna's restriction of dwelling entrances to floors one and four and the multi-dimensional housing design created privacy for residents, by placing bedrooms above or below the communal pedestrian path. 8 House is notable for the reinvented elevated pedestrian path, which guides and connects users and residents throughout the entire two-block site. In addition, every housing unit has a front yard, to increase social interaction. Although, the Collective Stratford has yet to be built, the proposal displays unprecedented affordable housing strategies. The Collective Stratford proposes the location of the affordable units on the top floors, and the hotel units on the bottom floors. Integrated public and communal spaces are placed throughout the building, including

[337] Ibid.
[338] "The Collective Stratford - Plp Architecture."

public access to restaurant on the twenty-second floor. The following precedent design strategies used to increase social interaction while maintaining privacy is incorporated into the Hoʻāliʻi design:

1. multi-level housing units;
2. housing entrances on designated floors;
3. front yards are provided for every housing unit; and
4. locations of communal spaces (shared kitchens, laundry rooms, exercise rooms, etc) are placed throughout the building.

6.3 Commercial and Parking at Hoʻāliʻi

Commercial spaces populate the first and second floor. 50,400 square feet of Hoʻāliʻi is for commercial spaces. The main commercial space is a grocery store, since there are no grocery stores within the mile radius. Although, there is a strong public transportation system within the surrounding context, which allows residents the accessibility and convenience to commute to required destinations (jobs, doctor appointments, meetings, etc.), residents can always seek employment downstairs, at these commercial spaces, downstairs from their apartment unit. In addition, this is a place where Hoʻāliʻi residents can interact with each other and an opportunity to connect with the surrounding neighborhood. Commercial spaces are on levels one and two.

50,400 square feet is for residential and commercial parking. A total of 240 parking stalls and six loading stalls are required for Hoʻāliʻi, which complies with HCDA regulations, Chapter 217- Mauka Area Rules.[339] Of the 240 parking stalls, 112 stalls are required for commercial parking, 38 parking stalls required for the market units, and 90

[339] "Repeal of Chapter 15-22 and Adoption of Chapter 15-217 Hawaii Administrative Rules," ed. Economic Development Department of Business, and Tourism (2011).

stalls for the affordable and reserved units. Of the six loading stalls required, four are dedicated to commercial, and two are dedicated for residential.

6.4 The Three-Floor Model

To follow precedent collective housing design strategies and the Immediate Environment Design Guidelines (IEDG), Hoʻāliʻi residential floor plans are designed to create social interaction, to provide privacy, and to induce a sense of security, by using the Three-Floor Model, which consists of an Up Communal Floor, a Residential Floor, and a Down Communal Floor. This Three-Floor Model is repeated ten times throughout the residential tower, with a total of twenty-nine floors (floor five to thirty-four), see Figure 20.

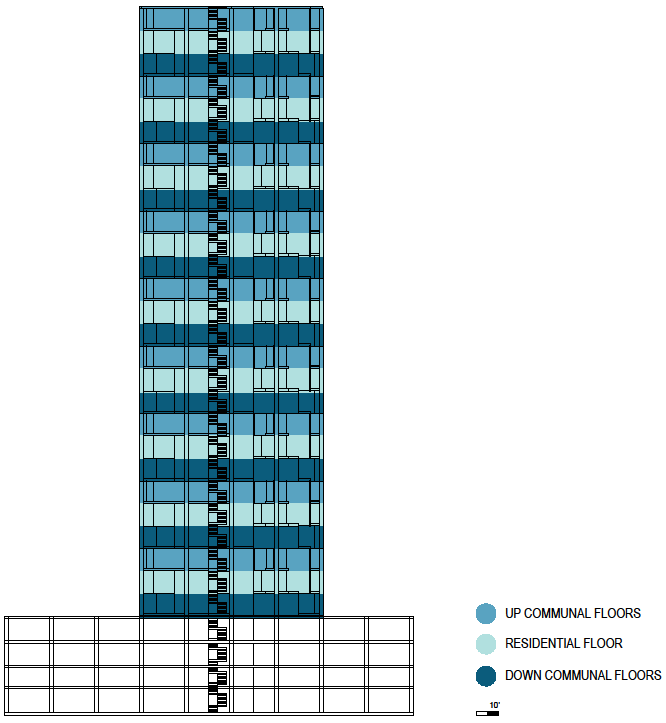

Figure 20: Three-Floor Model

The Up Communal Floor uses the entire floor area of 9,600 square feet. The Residential Floor uses 5,300 square feet, and the remainder square footage is used to provide privacy for the residents. The Down Communal Floor uses 8,628 square feet, which also uses the remainder square footage in order to create residential privacy (typically around housing unit entrances), see Table 6.3 Hoʻāliʻi Residential Program using the Three-Floor Model.

Table 6.3 Ho‘āli‘i Residential Program using the Three-Floor Model

	UP COMMUNAL FLOOR (FLOORS 5, 8, 11, 14, 17, 20, 23, 26, 29, 32)		RESIDENTIAL FLOOR (FLOORS 6, 9, 12, 15, 18, 21, 24, 27, 30, 33		DOWN COMMUNAL FLOOR (FLOORS 7, 10, 13, 16, 19, 22, 25, 28, 31, 34)	
AFFORDABLE UNITS SQF	ON UP COMMUNAL FLOOR	605	ON RESIDENTIAL FLOOR	1080	ON DOWN COMMUNAL FLOOR	685
RESERVED UNITS SQF		580		1735		460
MARKET UNITS SQF		540		1555		215
HOUSING SQF/FLOOR		1725		4370		1360
# OF FLOORS	10	17,250	10	43,700	10	13,600
TOTAL HOUSING SQF	74,550					
	TOTAL UNITS	**SQF**				
COMMUNAL SPACES	SPACE	SQF	SPACE	SQF	SPACE	SQF
	VERTICAL CIRC	400	VERTICAL CIRC	400	VERTICAL CIRC	400
	SOCIAL CORRIDOR	3552	SOCIAL CORRIDOR	0	SOCIAL CORRIDOR	3744
	KITCHEN	609	KITCHEN	0	KITCHEN	600
	KITCHEN LANAI	241	KITCHEN LANAI	0	KITCHEN LANAI	241
	MULTI-PURPOSE 1	413	MULTI-PURPOSE 1	0	MULTI-PURPOSE 1	425
	MULTI-PURPOSE 1 LANAI	193	MULTI-PURPOSE 1 LANAI	0	MULTI-PURPOSE 1 LANAI	110
	MULTI-PURPOSE 2	400	MULTI-PURPOSE 2	0	MULTI-PURPOSE 2	320
	MULTI-PURPOSE 2 LANAI	191	MULTI-PURPOSE 2 LANAI	0	MULTI-PURPOSE 2 LANAI	78
	LAUNDRY ROOM	393	LAUNDRY ROOM	0	LAUNDRY ROOM	370
	TERRARIUMS	1483	TERRARIUMS	260	TERRARIUMS	980
	UNUSED	0	UNUSED	270	UNUSED	0
NOT COUNTED SQF	OPEN TO BELOW	0	OPEN TO BELOW	4300	OPEN TO BELOW	972
TOTAL COMMUNAL SQF/FLOOR	**ON UP COMMUNAL FLOOR**	**7875**	**ON RESIDENTIAL FLOOR**	**930**	**ON DOWN COMMUNAL FLOOR**	**7268**
# OF FLOORS	10	**78,750**	10	**9,300**	10	**72,680**
TOTAL COMMUNAL SQF	160,730					
TOTAL FLOOR PLATE	UP COMMUNAL FLOOR	**9600**	RESIDENTIAL FLOOR	**5300**	DOWN COMMUNAL FLOOR	**8628**
# OF FLOORS	10	**96,000**	10	**53,000**	10	**86,280**
TOTAL SQF	235,280					

Communal Floors

Figure 21 shows where the communal floors are located throughout the building, with a total of twenty communal floors (ten Up Communal floors and ten Down Communal floors), with a total square footage of 182,280 square feet (refer to Table 6.3 Hoʻāliʻi Residential Program using the Three-Floor Model).

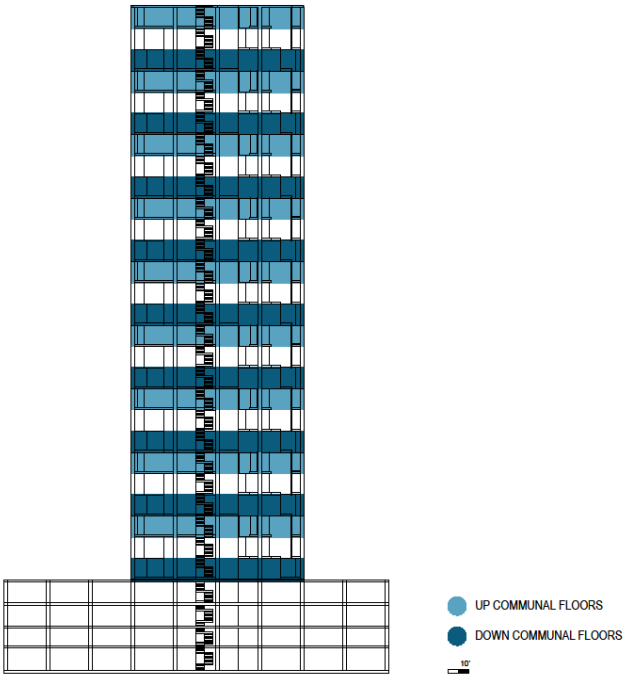

Figure 21: Hoʻāliʻi Communal Floors – Up and Down

To increase social interaction, residential elevators will only stop on these communal floors. Therefore, the entrance to residential units are located on these communal floors. To accommodate for more communal area and to eliminate the stigma of affordable housing, reserved housing, and SLH, these residential housing entrances are all of equal size, with a smaller footprint, approximately 250 square feet. The Communal Floors are designed with wide (social) corridors to connect communal spaces, such as communal kitchens, laundry amenities, and multipurpose rooms that can be used for formal

meetings and hobbies, and open spaces that can accommodate gardens, playgrounds, lanais, dog parks, and outdoor barbeque areas. The wide (social) corridor and small housing entrance footprints are designed to create “front yards” that are shared by three housing units, with a total of two shared front yards on each Communal Floor. Housing entrances open up to one another and to their shared front yards, which essentially creates a main entrance that can easily be overseen by adjacent housing units. The placement of housing entrances and front yards create a sense of security, which satisfies IEDG III.D. (design induces a sense of security).

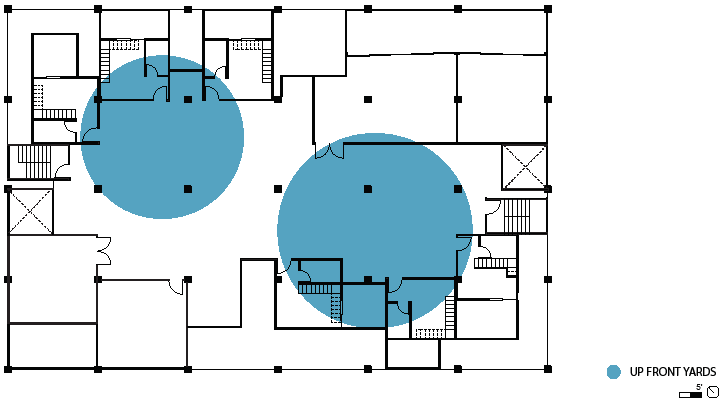

Figure 22: Up Communal Space- Front yards

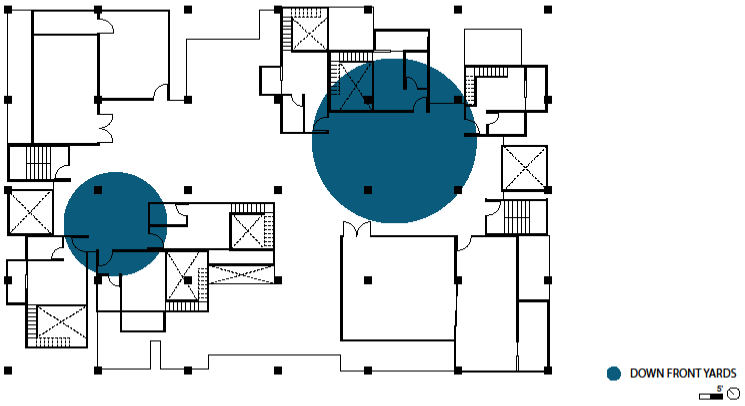

Figure 23: Down Communal Areas - Front yards

Figure 21 displays the two different communal floors, an Up Communal Floor and a Down Communal Floor of the Three-Floor Model, which repeat every three floors. The Up Communal Floor means that all housing entrances located on the Up Communal Floor will have an upstairs to the private residential spaces. Inversely, the Down Communal Floor means all housing units will have a downstairs to the private residential spaces. This design strategy of locating all residential housing entrances on the communal floors increases social interaction, while the second design strategy of placing the private residential spaces upstairs or downstairs provides privacy, which meets the IEDG III.B. (design should encourage social interaction) and IEDG III.C. (establish privacy between public and private spaces).

The Up Communal Floors (floors 5, 8, 11, 14, 17, 20, 23, 26, 29, and 32) dedicate 7,875 square feet to communal areas, which consists of the social corridor that allows space for informal meetings, front yards for every housing unit (see Figure 22), two multipurpose rooms, a communal kitchen, laundry room, and lanai spaces. The wide corridor allows a range of activities to occur, such as children's play, dog walking, and meeting friends. Figure 24 illustrates the locations of communal spaces that are located on these communal floors. 1,483 square feet of the Up Communal floor is inaccessible to establish residential privacy (shown in Figure 25). In order to create privacy for residents, these inaccessible spaces are actually ten to thirty foot-tall terrariums, due to their self-sustaining nature, no maintenance and accessibility is required (see Figure 26).

400 square feet is reserved for vertical circulation: two elevators and two fire-escape stairs. The rest of the square footage (1,725 square feet) is for the entrances of the Up Units.

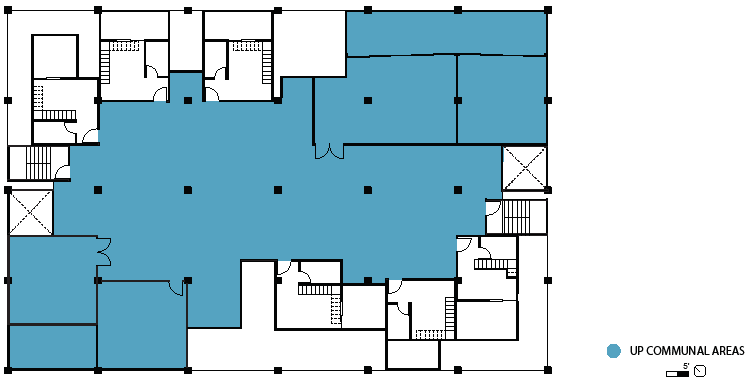

Figure 24: Up Configuration of Communal Spaces

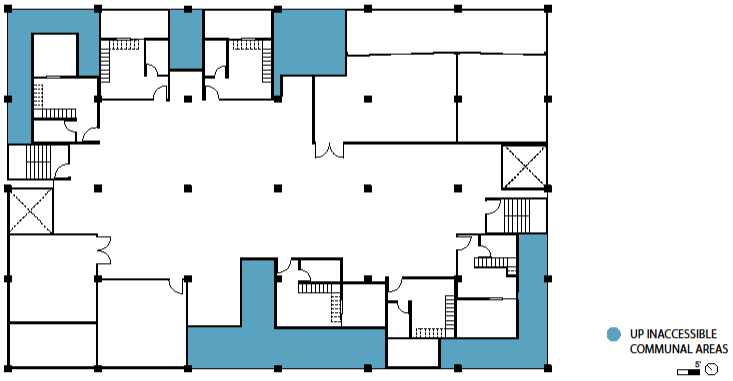

Figure 25: Up Communal Floor - Inaccessible Areas - Terrarium Locations

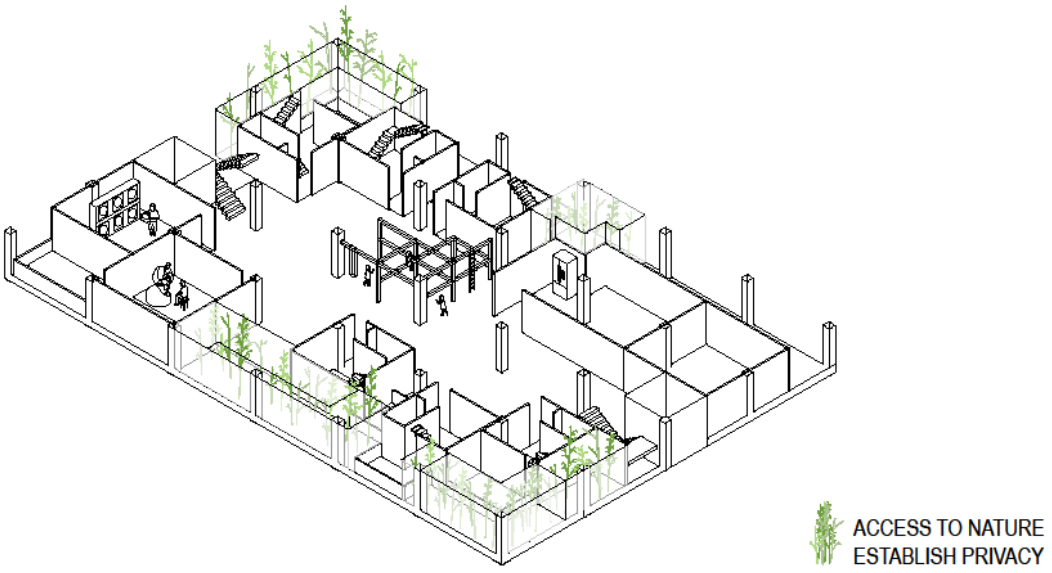

Figure 26: Inaccessible Areas-Terrariums

The Down Communal Floors (floors 7, 10, 13, 16, 19, 22, 25, 28, 31, and 34) provide the same program as the Up Communal floor plan, but has 7,268 square feet of communal spaces (see Figure 27), 980 square feet of inaccessible locations (see Figure 28), 400 square feet of vertical circulation, 972 square feet open to below for the twenty and thirty foot terrariums on the Up Communal and Residential Floors, and the rest (1,360 square feet) is dedicated to Down Unit entrances, refer to Table 6.3 Hoʻāliʻi Residential Program using the Three-Floor Model. See Figure 23 for the front yards on the Down Communal floor plan.

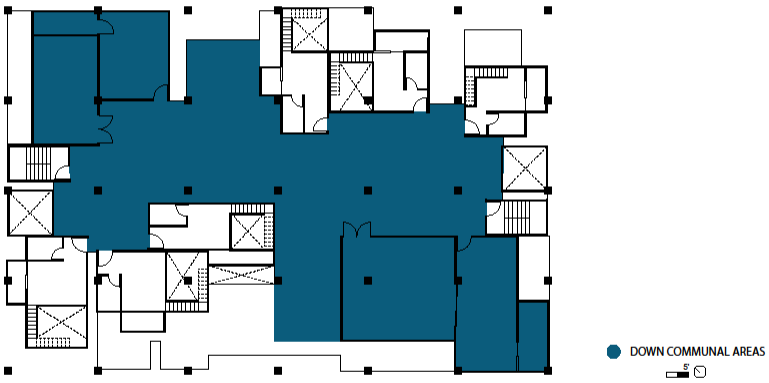

Figure 27: Down Configuration of Communal Spaces

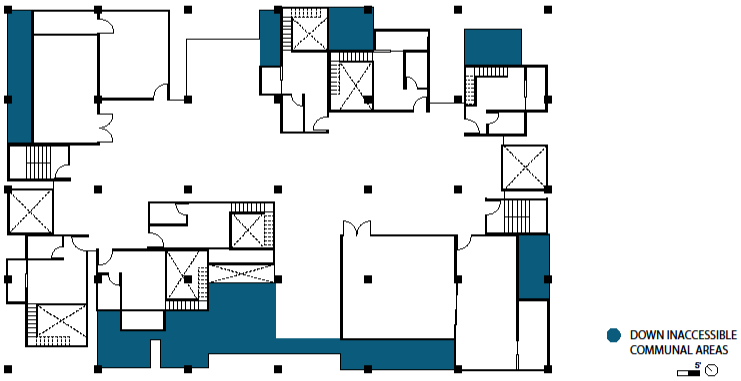

Figure 28: Down Communal Floor - Inaccessible Areas – Terrarium Locations

The Housing Units

All residential housing units (affordable, reserved, and market units) are only accessible from the communal floors, in order to increase social interaction and to establish privacy in housing units. All housing units have a small and same-sized (averaging 250 square feet) housing entrance footprint, which make housing types undistinguishable, also "helps in reducing the stigma that is often associated with lower priced housing," therefore eliminating the chances of exposure of the SLH and

recovering individuals, who are often stigmatized as well (see Figure 29 for Up Unit entrances and Figure 30 for Down Unit entrances).[340]

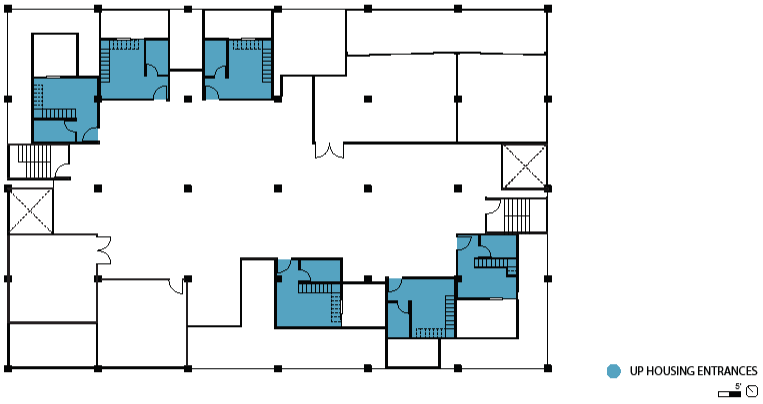

Figure 29: Up Unit Entrances-Plan

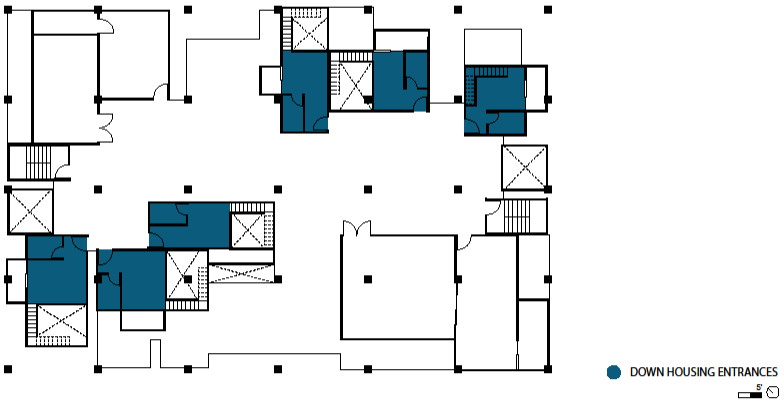

Figure 30: Down Unit Entrances-Plan

In addition, a range of all housing units (affordable, reserved, and market) exist amongst each other and share a communal floor. The housing entrances includes a 40 square foot bathroom, enough space for a small kitchen or living room, and an entrance to a private lanai (see Figure 31 and Figure 32).

[340] Hawaii Community Development Authority, "Mauka Area Plan," ed. Kakaako Community Development District (2011).

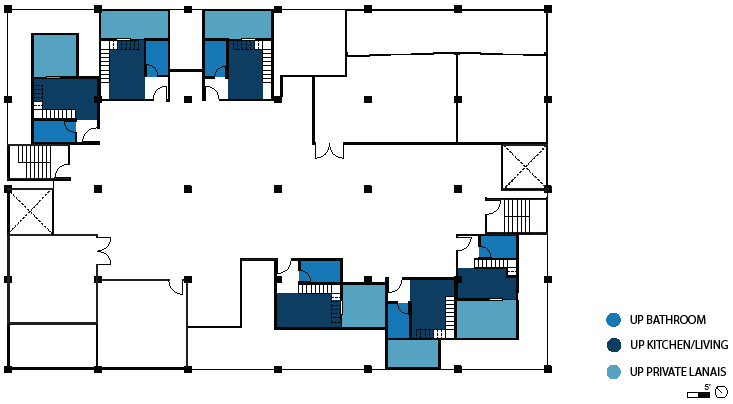

Figure 31: Up Housing Spatial and Functional Diagram

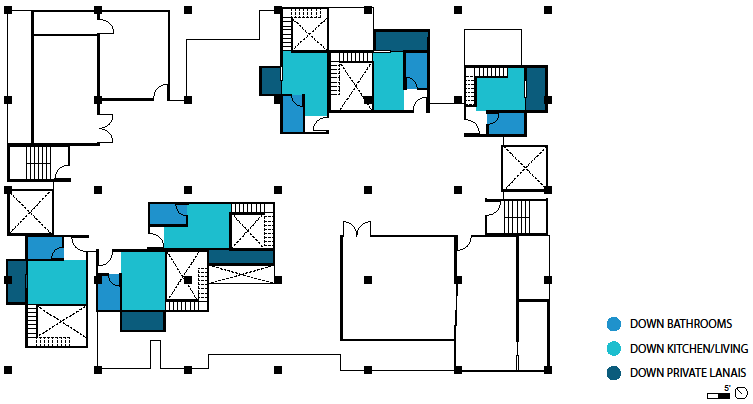

Figure 32: Down Housing Spatial and Functional Diagram

All units (affordable, reserved, market, down, and up) are intended for residents to have their own SROs (single-room occupancy), which complies with IEDG 3.3 establish privacy and IEDG 3.5 design for autonomy and a deinstitutionalized milieu. To provide more privacy, all the residential bedrooms are on the Residential Floor, which is in between the Up Communal Floor and the Down Communal Floor (refer to Figure 20 to see locations of the Residential Floors), and located on floors 6, 9, 12, 15, 18, 21, 24, 27, 30, and 33. Figure 33 illustrates visually where the Up Units and Down Units meet on

the Residential Floor. Refer to Table 6.4 Hoʻāliʻi (Affordable, Reserved, and Market) Units to see the spatial program of each housing unit.

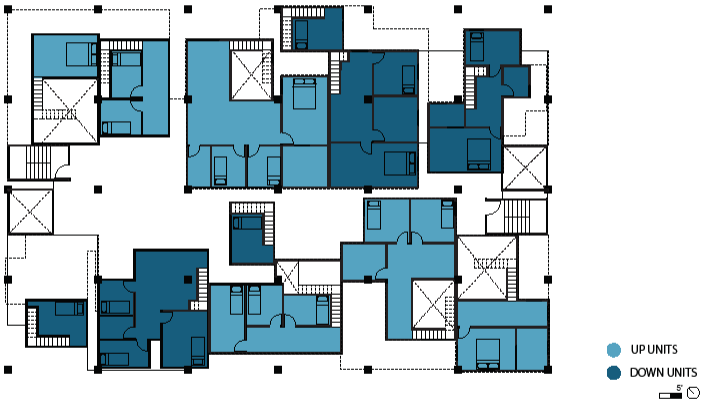

Figure 33: Residential Floor - Where Up and Down Units Meet – Plan

Table 6.4 Hoʻāliʻi (Affordable, Reserved, and Market) Units

UP COMMUNAL FLOOR (FLOORS 5, 8, 11, 14, 17, 20, 23, 26, 29, 32)		RESIDENTIAL FLOOR (FLOORS 6, 9, 12, 15, 18, 21, 24, 27, 30, 33				DOWN COMMUNAL FLOOR (FLOORS 7, 10, 13, 16, 19, 22, 25, 28, 31, 34)	
UNIT 1A, MARKET, 1B/1.5B				**UNIT 1B, AFFORDABLE, 1B/1B**			
ENTRY LEVEL (UP COMMUNAL FLOOR)		UPSTAIRS (RESIDENTIAL		DOWNSTAIRS (RESIDENTIAL		ENTRY LEVEL (DOWN COMMUNAL FLOOR)	
ENTRY WAY	25	BEDROOM	120	BEDROOM	85	ENTRY WAY	25
LIVING ROOM	0	BATHROOM	65	STORAGE	50	LIVING ROOM	65
KITCHEN	20	LIVING ROOM	120			KITCHEN	65
LAUNDRY/STORAGE	40					LAUNDRY/STORAGE	0
BATHROOM (0.5)	40					BATHROOM	40
PRIVATE LANAI	115					PRIVATE LANAI	50
TOTAL SQF	240	TOTAL SQF	305	TOTAL SQF	135	TOTAL SQF	245
		TOTAL UNIT SQF	545			TOTAL UNIT SQF	380
UNIT 1B, RESERVED 1B/1B				**UNIT 1B, AFFORDABLE, 1B/1B**			
1ST FLOOR SQF (COMMUNAL FLOOR)		UPSTAIRS (RESIDENTIAL		DOWNSTAIRS (RESIDENTIAL		ENTRY LEVEL (DOWN COMMUNAL FLOOR)	
ENTRY WAY	25	BEDROOM	135	BEDROOM	85	ENTRY WAY	25
LIVING ROOM	0	BATHROOM	0	STORAGE	50	LIVING ROOM	45
KITCHEN	135	LIVING ROOM	0			KITCHEN	45
LAUNDRY/STORAGE	0					STORAGE	15
BATHROOM	40					BATHROOM	40
PRIVATE LANAI	100					PRIVATE LANAI	50
TOTAL SQF	300	TOTAL SQF	135	TOTAL SQF	135	TOTAL SQF	220
		TOTAL UNIT SQF	435			TOTAL UNIT SQF	355
UNIT 2A, RESERVED, 2B, 1.5B				**UNIT 1B, AFFORDABLE, 1B/1B**			
1ST FLOOR SQF (COMMUNAL FLOOR)		UPSTAIRS (RESIDENTIAL		DOWNSTAIRS (RESIDENTIAL		ENTRY LEVEL (DOWN COMMUNAL FLOOR)	
ENTRY WAY	25	BEDROOM 1	100	BEDROOM	85	ENTRY WAY	25
LIVING ROOM	0	BEDROOM 2	100	STORAGE	50	LIVING ROOM	45
KITCHEN	65	LIVING ROOM	195			KITCHEN	45
LAUNDRY/STORAGE	65	BATHROOM	80			STORAGE	15
BATHROOM (0.5)	40					BATHROOM	40
PRIVATE LANAI	85					PRIVATE LANAI	50
TOTAL SQF	280	TOTAL SQF	475	TOTAL SQF	135	TOTAL SQF	220
		TOTAL UNIT SQF	755			TOTAL UNIT SQF	355
UNIT 2B, AFFORDABLE, 2B, 1B				**UNIT 2C, RESERVED, 2B/2B**			
1ST FLOOR SQF (COMMUNAL FLOOR)		UPSTAIRS SQF		DOWNSTAIRS (RESIDENTIAL		ENTRY LEVEL (DOWN COMMUNAL FLOOR)	
ENTRY WAY	25	BEDROOM 1	100	BEDROOM 1	185	ENTRY WAY	25
LIVING ROOM	0	BEDROOM 2	100	BEDROOM 2	100	LIVING ROOM	0
KITCHEN	90	CIRCULATION	120	LIVING ROOM	135	KITCHEN	90
STORAGE	40			BATHROOM 2	100	STORAGE	0
BATHROOM	40			STORAGE	50	BATHROOM 1	40
PRIVATE LANAI	105					PRIVATE LANAI	60
TOTAL SQF	300	TOTAL SQF	320	TOTAL SQF	570	TOTAL SQF	215
		TOTAL UNIT SQF	620			TOTAL UNIT SQF	785
UNIT 3A, AFFORDABLE, 3B, 1B				**UNIT 2D, MARKET, 2B/2.5B**			
1ST FLOOR SQF (COMMUNAL FLOOR)		UPSTAIRS SQF		DOWNSTAIRS (RESIDENTIAL		ENTRY LEVEL (DOWN COMMUNAL FLOOR)	
ENTRY WAY	25	BEDROOM 1	80	BEDROOM 1	135	ENTRY WAY	25
LIVING ROOM	0	BEDROOM 2	80	BEDROOM 2	95	LIVING ROOM	0
KITCHEN	100	LIVING ROOM	195	BATHROOM 1	70	KITCHEN	100
STORAGE	40	BATHROOM	0	BATHROOM 2	40	STORAGE	0
BATHROOM	40			LIVING ROOM	60	BATHROOM (0.5)	40
PRIVATE LANAI	100			STORAGE	50	PRIVATE LANAI	50
TOTAL SQF	305	TOTAL SQF	355	TOTAL SQF	450	TOTAL SQF	215
		TOTAL UNIT SQF	660			TOTAL UNIT SQF	665
UNIT 3B, MARKET 3B, 2.5B				**UNIT 3C, RESERVED 3B/2B**			
1ST FLOOR SQF (COMMUNAL FLOOR)		UPSTAIRS SQF		DOWNSTAIRS (RESIDENTIAL		ENTRY LEVEL (DOWN COMMUNAL FLOOR)	
ENTRY WAY	25	BEDROOM 1	75	BEDROOM 1	70	ENTRY WAY	25
LIVING ROOM	0	BEDROOM 2	75	BEDROOM 2	125	LIVING ROOM	0
KITCHEN	90	BATHROOM 1	50	BEDROOM 3	70	KITCHEN	135
LAUNDRY/STORAGE	40	CIRCULATION	130	BATHROOM 1	40	STORAGE	0
BATHROOM (0.5)	40	LIVING ROOM	200	LIVING ROOM	200	BATHROOM	40
PRIVATE LANAI	105	BEDROOM 3	165	STORAGE	50	PRIVATE LANAI	45
		BATHROOM 2	105				
TOTAL SQF	300	TOTAL SQF	800	TOTAL SQF	555	TOTAL SQF	245
		TOTAL UNIT SQF	1100			TOTAL UNIT SQF	800

The Up Units consist of six different unit types: Unit 1A, Unit 1B, Unit 2A, Unit 2B, Unit 3A, and Unit 3B (refer to Figure 34 and Table 6.4 Hoʻāliʻi (Affordable, Reserved, and Market) Units). Unit 1A (market unit) is a one bedroom, one and a half bathroom, kitchen, lounge or living room space, laundry room, and a private lanai (545 square foot unit). Unit 1B (reserved unit) is a one-bedroom, one-bathroom unit with space for a kitchen, and a private lanai, with a total square footage of 435 square feet, ideal for individuals who are ready for the independence and individual responsibility. Unit 2A is a reserved housing unit, a two bedroom, one and a half bathroom, kitchen, space for a living room, laundry room, and a private lanai (755 square foot apartment). Unit 2B (affordable unit) is a two-bedroom, one-bathroom unit, with space for a kitchen or a living room and a private lanai, that is 620 square feet, which can be used by two separate individuals or a single-parent family. Unit 3A (affordable unit) is a three-bedroom, one bathroom, with space for a kitchen or living room and a private lanai, 660 square foot unit, which is ideal for individuals who are looking for more support from their peers. Unit 3B (market unit) is a three bedroom, two and a half bathroom, kitchen, living room, laundry room, and a private lanai, which is a 1,100 square foot apartment, optimal for a family.

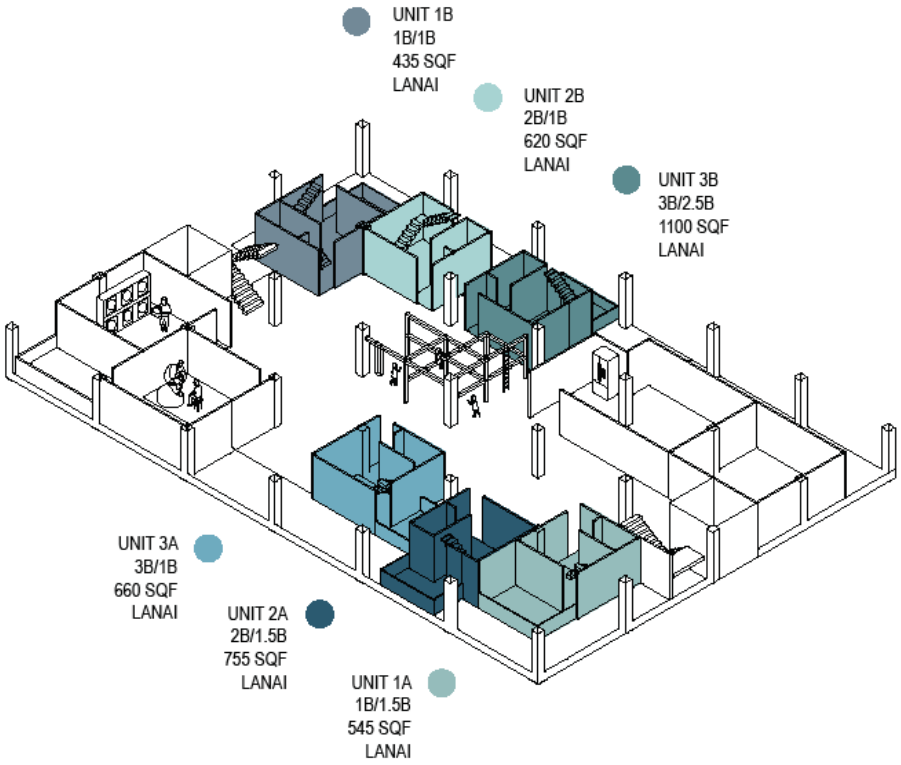

Figure 34: Up Units – Isometric

The Residential Floors (floors 6, 9, 12, 15, 18, 21, 24, 27, 30, and 33) are inaccessible from the elevators and fire-escape stairs, and only accessible from an Up or a Down Unit. Residents cannot exit from these floors. In case of an emergency, residents are required to either go upstairs or downstairs (back to an Up Communal Floor or a Down Communal Floor), to exit their housing unit, then take the fire-escape stairs located on the Up and Down Communal Floors.

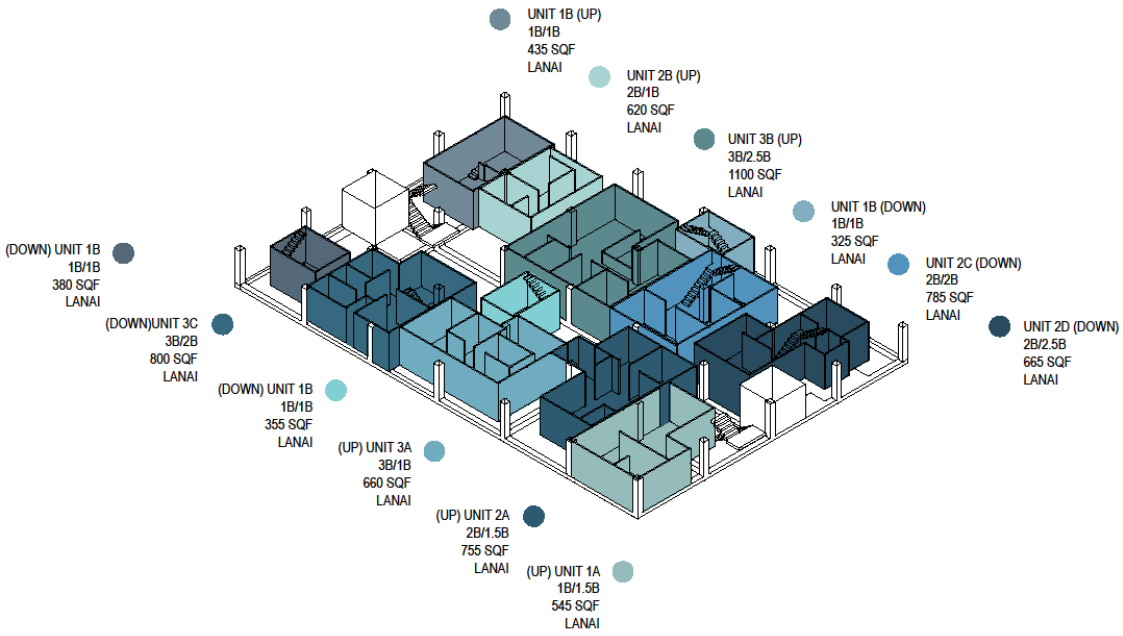

Figure 35: Residential Floor - Where Up and Down Units Meet - Isometric

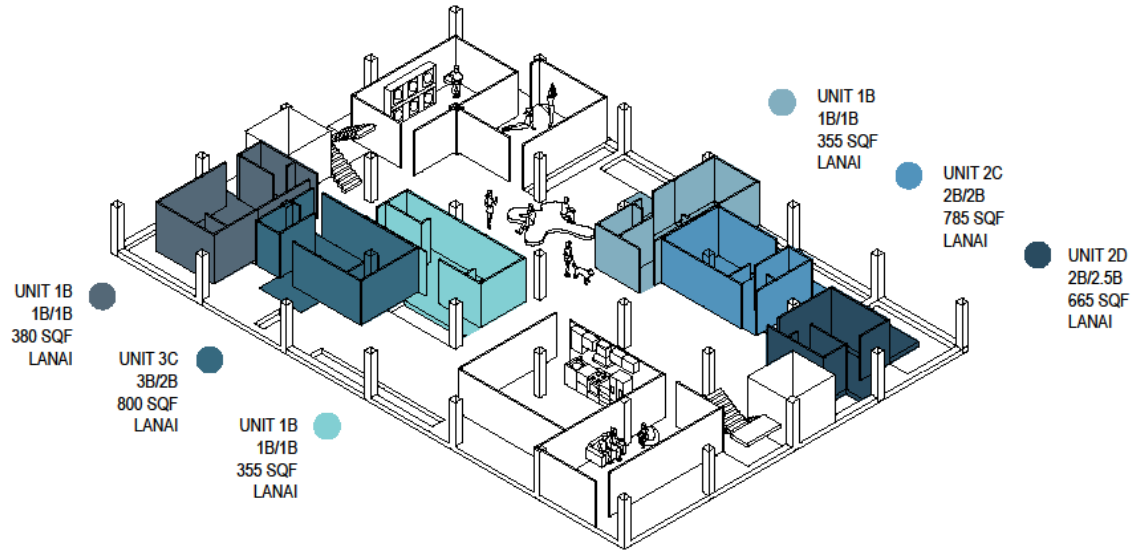

Figure 36: Down Units - Isometric

There are six Down Units on the Down Communal floor (floors 7, 10, 13, 16, 19, 22, 25, 28, 31, and 34), which are Unit 1B, Unit 2C, Unit 2D, and Unit 3C. There are three 1B units, intended for affordable housing. The 1B units are variations of the same

floor plan, ranging from 355 square feet to 380 square feet, with one bedroom, one bathroom, space for a kitchen and living space, storage, and a private lanai. Unit 2C is a 785 square foot reserved unit, with two bedrooms, two bathrooms, kitchen, laundry room, and a private lanai. Unit 2D is a 665 square foot market unit with two bedroom, two and a half bathrooms, kitchen, living room, laundry room, and a private lanai. Unit 3C is an 800 square foot reserved unit, with three bedrooms, two bathrooms, kitchen, storage, and a private lanai.

6.5 Building Shell

Hoʻāliʻi is designed to be a naturally ventilated structure that uses an open grid structure enclosed by a stainless steel wire mesh, on all four facades. The stainless steel wire mesh must be 316 gauge or higher quality, to prevent corrosion. Due to its low-required maintenance and its ventilation capabilities, wire mesh can be seen on many parking structures, and are becoming more popular among building facades. The residential tower is oriented from east to west, to receive the north-east winds and to avoid harsh direct sunlight on the 80' west façade (Figure 37). In addition to natural ventilation, the wire mesh allows natural light to penetrate through, which complies with IEDG III.G.1 and III.G.2 (provide multiple sources of light and create transition zones). The transition zone is the wire mesh itself because it does obstruct some sunlight. A second transition zone is the terrariums, which would create both visual comfort and thermal comfort.

Figure 37: Sun and Wind Diagram of Hoʻāliʻi

The design of Hoʻāliʻi focused on creating spaces for social interaction, to reduce the stigma and misconception of affordable, SLH, and recovering individuals, for the purpose of allowing recovering individuals the accessibility to live in healthy environments. With the application of the IEDG and collective housing precedents: Narkomfin Dom-Kommuna, 8 House, and the Collective Stratford, design strategies such as the Three-Floor Model were developed. The Three-Floor Model promotes social interaction while maintaining privacy by restricting access to only communal floors, unison housing footprint on communal floors, and utilizing the wide social corridor.

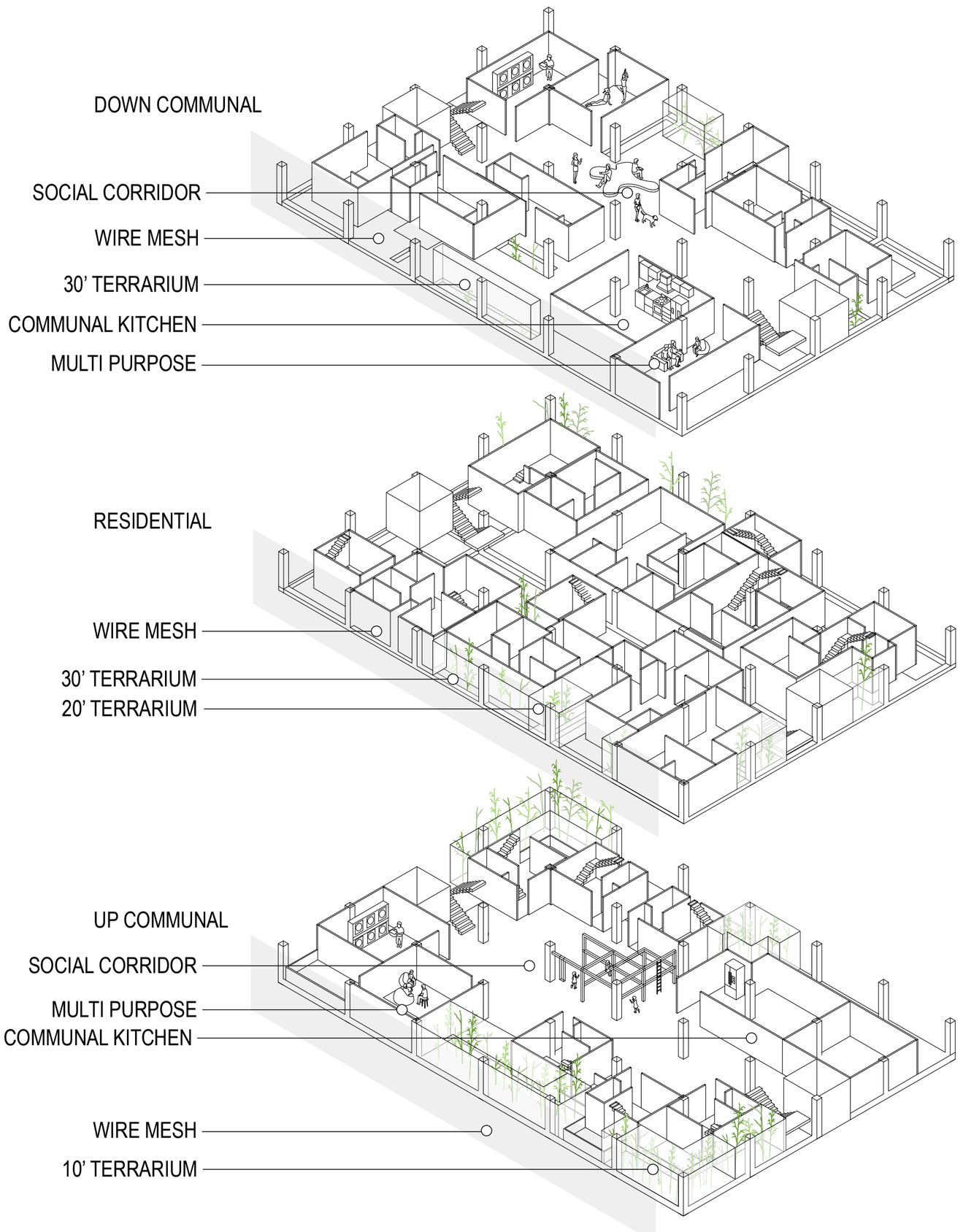

Figure 38: Ho ‘ali‘i - Three-Floor Model Isometric

Conclusion

This project aimed to prove that accessible and affordable housing, located in positive environments can help prevent relapse, among recovering individuals. This research concluded that the environment is the most essential component of SLH, particulary the effects of the physical and the social environment. The immediate (architectural) environment supplements the success of the physical and social environment. The SLH Design Guidelines were created for architects, planners, developers, and housing owners, to present site selection techniques and design strategies for new construction of SLH.

To design a successful SLH, the best location must be selected, by studying existing factors of the physical environment and the social environment. The physical environment must be an accessible location that promotes healthy living, which can be determined by studying existing health and social services, the existing streets, and the available modes of transportation. The success of the social environment can be determined by studying the availability of social participation (community organizations), crime rates, and population density. Existing research, SITC staff housing case study, and the collective housing precedents consistently suggested the immediate environment must encourage social interaction, as well as establish privacy.

Hoʻāliʻi was designed as a mixed-use, mixed-income, high-rise development located in Kakaʻako, produced by the SLH Design Guidelines. The Three-Floor model was created as a design strategy to not only increase social interaction, but also to provide privacy, furthermore reducing the stigma and misconception of affordable housing, SLH, and recovering individuals.

The only way to determine the success of the SLH Design Guidelines, would be to test the design guidelines, and see the outcomes of the recovering individuals. If these design guidelines are tested, it should be noted that SLH is not for all recovering individuals. The SLH Design Guidelines can be further developed and invites colleagues to contribute, by providing specific design strategies of the immediate environment.

Bibliography

"8 Parking & Transportation Demand Management." edited by Transportation Demand Management, 2013.

"8h - the 8-House." @vimeo, 2018.

"45-619 Keaahala Road, Kaneohe Hi - Walk Score." https://www.walkscore.com/score/loc/lat=21.41029190595708/lng=-157.80770301818848.

"94-959 Awanei Street, Waipahu Hi - Walk Score." https://www.walkscore.com/score/94.dash.959-awanei-st-waipahu-hi-96797.

"777 South King Street, Honolulu Hi - Walk Score." https://www.walkscore.com/score/777-s-king-st-honolulu-hi-96813.

@dezeen. "Big's 8 House Succeeded Where Smithson's Streets Failed, Says Bjarke Ingels." (2016-02-03 2016).

@khonnews. "Part of Thomas Square to Reopen Following Million-Dollar Maintenance Project." (2017-09-27 2017).

"About the Medical Center." http://queensmedicalcenter.org/about-us-home.

"Adult Mental Health Division | About." http://health.hawaii.gov/amhd/hawaii-state-hospital-about-us/.

Anelo, Chioma Velma. "Reconsidering Rehabilitative Environments: Transitional Housing for Recovering Drug Addicts." Dalhousie Univeristy, 2007.

Architecture, PLP. "The Collective Stratford Design and Access Statement." 2015.

Authority, Hawaii Community Development. "Mauka Area Plan." edited by Kakaako Community Development District, 2011.

Best, David W., and Dan I. Lubman. "The Recovery Paradigm - a Model of Hope and Change for Alcohol and Drug Addiction." *Australian family physician* 41, no. 8 (2012): 593.

"Big | Bjarke Ingels Group." http://big.dk/press/8_66.

"Big | Bjarke Ingels Group." https://www.big.dk/#projects-8.

Blair, Allyson. "Most Oahu Arrests Involve Those with Drug Addictions, Mental Illness." (2017).

Brown, Nellie J. "Health Hazard Manual: Wastewater Treatment Plant and Sewer Workers." Itaca, NY: Cornell University, Workplace Health and Safety Program, 1997.

Carter, Morgan M. "Physical Landscape/Mental Landscape: Mental Health, Architecture and the City." Dalhousie University, 2008.

"Center Detail." http://parks.honolulu.gov/cD.sdi?center_id=146.

"City & County of Honolulu - Department of Parks & Recreation - Park Information." http://gis.hicentral.com/fastmaps/parks/ParkDetails.aspx?id=182&lyrLst=1%7C0%7C0%7C0%7C1%7Clblsaerial2008.

"City and County of Honolulu 2010 Census Tracts." edited by Office of Planning.

Clark, T. Blake. "Honolulu Streets." The Printshop, 1939.

Counselor. "Sand Island Treatment Center Counselor Interview." By Catherine C. Kenjo (November 1, 2017).

"Department of C & C: Parks & Recreation: Waipahu District Park/Gym/Pool - Waipahu - - Honolulu County, Hawai'i." http://honolulucounty.hi.networkofcare.org/mh/services/agency.aspx?pid=DepartmentofCCParksRecreationWaipahuDistrictParkGymPool_899_2_0.

"Department of Health: Oahu Community Mental Health Windward: Oahu Treatment Services Section - Kaneohe - - Honolulu County, Hawai'i." http://honolulucounty.hi.networkofcare.org/mh/services/agency.aspx?pid=DepartmentofHealthOahuCommunityMentalHealthWindwardOahuTreatmentServicesSection_899_2_0.

"Department of Planning & Permitting, Online Service for Online Geographic Information System Maps of Honolulu." http://www.honoluludpp.org/OnlineServices/OnlineGISMaps.aspx.

Dept of Planning and Permitting, Honolulu Land Information System (HoLIS), and Department of and Permitting Honolulu Land Information System (Holis), City and County of Honolulu. "Sde.Cch.Hospital_Clinic." Department of Planning and Permitting, Honolulu Land Information System (HoLIS), http://gis.hicentral.com/pubwebsite/metadata/Hospital_clinic.html.

Ed. D., Polcin, Douglas L., Korcha M.A., Rachael., Bond Ph.D., Jason., and Galloway Pharm.D., Gantt. "What Did We Learn from Our Study on Sober Living Houses and Where Do We Go from Here?", edited by Alcohol Research Group Public Health Institute. California, 2010.

Evans, Gary W. "Environmental Stress." Cambridge [Cambridgeshire] ; New York: Cambridge Cambridgeshire ; New York : Cambridge University Press, 1982.

"Fees." https://www.honolulu.gov/des/golf/fees.html.

"Flood Hazard Assessment Tool." http://gis.hawaiinfip.org/FHAT/.

"Forms - Hina Mauka." http://www.hinamauka.org/adult-programs/forms/.

Forsyth, Ann. "What Is a Walkable Place? The Walkability Debate in Urban Design." (2015).

Freudenberg, N. "Health Promotion in the City: A Review of Current Practice and Future Prospects in the United States." *Annu. Rev. Public Health.* 21, no. 1 (2000): 473-503.

"Hawai'i Community Development Authority | Plans/Rules." http://dbedt.hawaii.gov/hcda/plans-rules/.

"Hawaii 2011-2015 Acs 5-Year Estimates by Census Tracts & Legislative Districts." https://histategis.maps.arcgis.com/apps/MapSeries/index.html?appid=437e17f335774aceb4716283009e8496.

"Hina Mauka - Waipahu Outpatient Office." http://www.addicted.org/directory/item/hina-maukateen-care-kahuku-high-and-intermediate-school.html.

"Hpd Information." http://honolulupd.org/information/index.php?page=crimemapping.

Jason, L. A., and J. R. Ferrari. "Oxford House Recovery Homes: Characteristics and Effectiveness." [In eng]. *Psychol Serv* 7, no. 2 (May 2010): 92-102.

"Kaiser Permanente Honolulu Medical Office - Services and Locations - Kaiser Permanente." https://healthy.kaiserpermanente.org/health/care/!ut/p/a0/FcdNCoAgEAbQs3SA-Awkol2nKN0NY9mAf4QU3r56uweLDTbRLZ6q5EThuzmIJUhts2uJojBWWFhxMINSWo__ykU-EkzKPROfO0qM07N03QvWkHZm/.

"Map of Biki Stops - Biki." https://gobiki.org/map-of-biki-stops/.

Maps, Google. "Sand Island." https://www.google.com/maps/search/google+maps/@21.3128985,-157.8811236,7607m/data=!3m1!1e3.

maps of oahu, maps_of_oahu, map oahu, mapsoahu, mapsofoahu, maps honolulu, oahu maps. ""Maps of Oahu" -Honolulu Gis." http://honolulugis.org/.

"Neighborhood Boards." https://honolulu-cchnl.opendata.arcgis.com/datasets/f77ece67e30e46e7b38edac6d199aab5_5?uiTab=charts.

Nurse, Jo, Paul Woodcock, and Jim Ormsby. "Influence of Environmental Factors on Mental Health within Prisons: Focus Group Study.(Primary Care)." *British Medical Journal* 327, no. 7413 (2003): 480.

"Oahu Bikeways Map." http://cchnl.maps.arcgis.com/apps/OnePane/basicviewer/index.html?appid=96d111b4f0c0400484dfcbd7f6c435ad.

"Oxford House." https://www.oxfordhouse.org/userfiles/file/purpose_and_structure.php.

"Parcel & Zoning Information." http://cchnl.maps.arcgis.com/apps/Viewer/index.html?appid=bc24f3eb50f94f698d830aed9c428548.

Per, Aurora Fernandez., Javier. Mozas, and Alex S. Ollero. "10 Stories of Collective Housing." Vitoria-Gasteiz, Spain: a+t architecture publishers, 2013.

Permitting, City and County of Honolulu Department of Planning and. "Honolulu Internet Permit System - Building Permit Search." http://dppweb.honolulu.gov/DPPWeb/Default.aspx?PossePresentation=BuildingPermitSearch.

Polcin DL., Henderson, D. "A Clean and Sober Place to Live: Philosophy, Structure, and Purported Therapeutic Factors in Sober Living Houses." *Journal of Psychoactive Drugs* 40, no. 2 (2008): 6.

"Repeal of Chapter 15-22 and Adoption of Chapter 15-217 Hawaii Administrative Rules." edited by Economic Development Department of Business, and Tourism, 2011.

"Resident Population for Oahu Neighborhoods: 2000 and 2010." 2016.

"Sand Island (Detention Facility) | Densho Encyclopedia." http://encyclopedia.densho.org/Sand%20Island%20%28detention%20facility%29/.

"Search for Transportation | Honolulu Open Geospatial Data." https://honolulu-cchnl.opendata.arcgis.com/datasets?q=Transportation&sort_by=relevance.

Shepley, Mardelle Mccuskey, Angela Watson, Francis Pitts, Anne Garrity, Elizabeth Spelman, Janhawi Kelkar, and Andrea Fronsman. "Mental and Behavioral Health Environments: Critical Considerations for Facility Design." *General Hospital Psychiatry* 42 (2016): 15-21.

"Story Map Journal." https://cchnl.maps.arcgis.com/apps/MapJournal/index.html?appid=bc7dd6fd9f2140348621a8ee1db41966.

"Straub - Locations - Straub Medical Center - Hawaii Pacific Health." https://www.hawaiipacifichealth.org/straub/locations/straub-medical-center/.

"The Collective Stratford - Plp Architecture." http://www.plparchitecture.com/the-collective-stratford.html.

Tresidder, Mike. "Using Gis to Measure Connectivity: An Exploration of Issues." Portland, Oregon: Portland State University, 2005.

UOdocent. "Honolulu Population Density." http://www.arcgis.com/home/item.html?id=6119c8e7760a490fa28a9e41780edcae .

User, Super. "Route Map." (2018).

"Waipahu Town Action Plan." edited by City and County of Honolulu, 2017.

"Wcchc - Location - Waipahu Family Health Center." http://www.wcchc.com/Contact/Waipahu-Family-Health-Center-Primary-Care.

Wittman, Friedner D. "Affordable Housing for People with Alcohol and Other Drug Problems." *Contemporary Drug Problems* 20, no. 3 (1993): 541-609.

Woolf, Steven H., Laudan Y. Aron, supporting host National Academies . Panel on Understanding Cross-National Health Differences Among High-Income Countries, and supporting host Institute of Medicine . Board on Population Health and Public Health Practice. *U.S. Health in International Perspective : Shorter Lives, Poorer Health.* Washington, District of Columbia : The National Academies Press, 2013.

Youssef, Omar. "Therapeutic Architecture Design Index." Arizona: University of Arizona, 2014.